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RUBBER AND LEATHER BELTING, Packing, Rubber, Linen and Cotton Hose, Raw-Hide Lace Leather, Car Springs, Mats, etc. Also manufacturers of the celebrated **DOUBLE-TUBE AIR BRAKE HOSE** and **"HERCULES" STEAM FIRE ENGINE HOSE**. Write for Price List and Circulars.

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IRON**ROOFING & SIDING.**

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GENERAL AGENTS **IRON ORE PAINTS**, Office and Works,

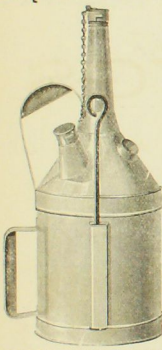
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NOYES' PATENT LIQUID COOLER & COMPOUND LUBRICATOR,

For Cooling Railroad Car and Steamboat Journals and Bearings of all kinds, and for Mixing with Other Oils.



The attention of those who are running heavy journals is respectfully invited to the above Liquid Cooler. It has been successfully used for upward of ten years, and is constantly growing in favor as its merits become known, and we are confident that practical men cannot fail of being convinced that our preparation does, even their candid attention. What we claim for it is:

That it will Cool a Hot Journal When in Motion and extinguish the flame when the box is on fire; that its use will, in a great measure, prevent the occurrence of a hot journal, and save the expense, delays and annoyances incident thereto; that it will eliminate the heat from a journal at a temperature greatly below the point required to melt the babbit, preventing the accumulation of heat, and by a timely application save it from destruction; that its non-inflammable elements where waste is used, permeate the waste and prevent its taking fire; that it keeps the journal smooth and polished, preventing unnecessary friction; that its combination is based upon true scientific principles, which renders it impossible to fail in its results, and is the

Only Preparation that will Cool a Hot Journal

while it is in motion, as attestedly certifies below; that one thorough application on a hot journal will do more execution in cooling than the constant application of water for half an hour, besides doing it evenly and without loss of time.

Every Railroad Train or Steamboat should have a can of the Liquid Packing on board, with the directions for its use pasted upon it, and thus have always at hand the means of effectually cooling a hot journal, and thereby avoid the expense, danger and trouble from this cause.

WHAT RAILROAD MEN SAY OF IT.

SALER, AUG. 28, 1872.
MR. P. NOYES.—Dear Sir: I have been using your Liquid Cooler for cooling car journals for some time past, and have been well pleased with it. I have had occasion to use it a number of times, under Pullman Cars, and it has been a complete remedy in every case of hot journals.

Every train should be provided with it, as it is a saving of time and expense in the running of trains, provided it is applied and cared for according to directions for using.

Yours truly,

J. P. SORREY,

M. C. B. Eastern Railroad.

SALER, AUG. 28, 1880.
I can recommend Noyes' Liquid Cooler as an excellent article to carry on trains for use in case of hot journals, which it cools without injury to the journals, more effectively than anything I know of.

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Our Liquid Cooler is now in use, and has been from one to eight years, upon the following roads, and we have numerous recommendations from them: Boston & Maine R. R., Boston & Lowell R. R., Eastern R. R., New York & New Haven & Hartford R. R., New York & New England R. R., Connecticut River R. R., Delaware & Hudson Canal Co., Old Colony.

SEND FOR A BARREL. NO CHARGE UNLESS IT DOES ALL WE STATE.

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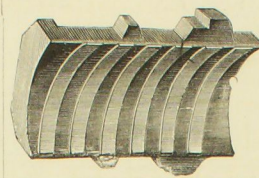
The prices of Worthington Steam Pumps and Boilers combined, for Railway Tank service, have been reduced. The combination embodies some improvements that have been made subject of letters patent, and the above reduction is made in order to insure its speedy adoption. The pumps are used on nearly all of the principal Railroads in this country and Canada. Send for Circular and reduced Price-list.

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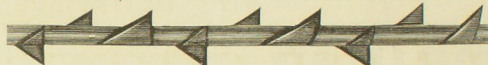
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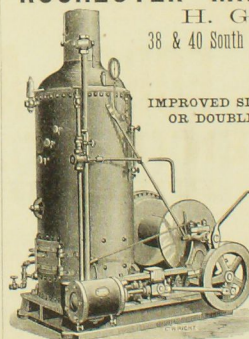
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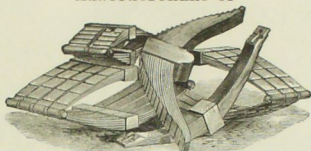
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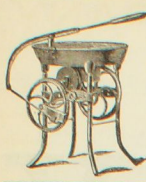
We make a Specialty of our well-known brand of Railway Axles marked "Special" from new iron, guaranteed to be purely fibrous, and to stand the regulation drop test of the Penna. R. R. Company.

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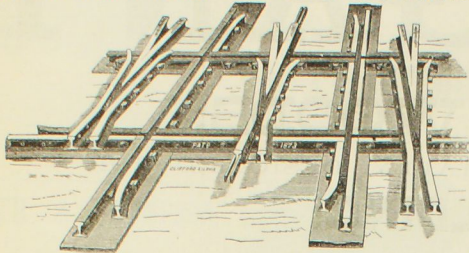


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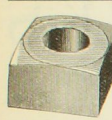
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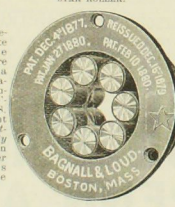
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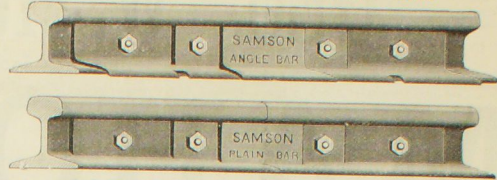
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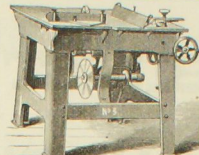


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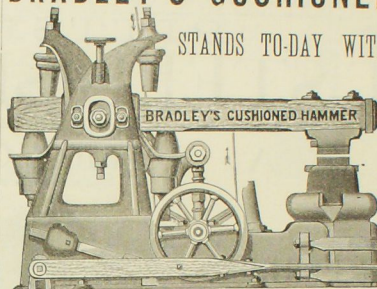
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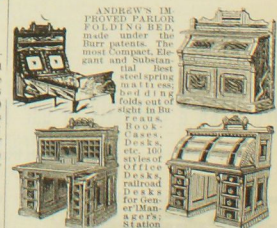
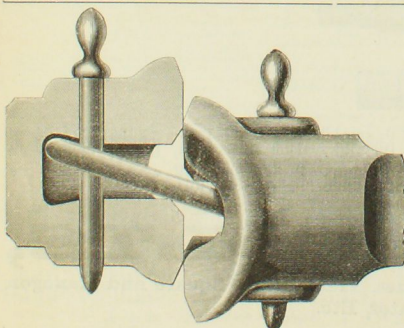
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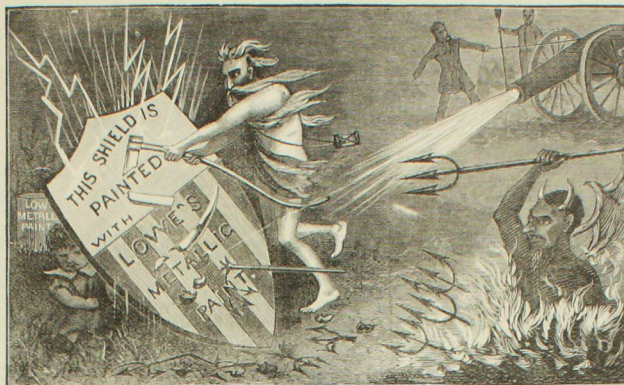
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We have found it perfectly satisfactory and equal to any we have ever used.
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It is the best Metallic Paint we have used.
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Manufacturers of Wagons and Carriages,
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Our Paint is manufactured in a very superior manner, and is warranted to contain not less than 25 per cent. of Metallic Iron. It takes much less oil than any other Metallic Paint, for which see certificates above. It is now being used on the following lines of railways: Western & Atlantic R. R.; Yorkville & Meridian R. R.; Rochester & Pittsburgh R. R.; Richmond & Petersburg; Richmond, York River & C. R. R.; Paducah & Elizabethtown R. R.; N. Y. & Mexican R. R.; N. C. & St. Louis R. R.; Macon & Brunswick R. R.; Memphis & Charleston R. R.; M. & O. R. R.; Miss. & Tenn. R. R.; L. N. & Great So. R. R.; L. P. & C. R. R.; Gulf, Col. & Santa Fe R. R.; E. V. & Ga. R. R.; Central R. R. & Banking Co.; C. & R. V. R. R.; H. & D. R. R.; C. & R. R.; Ala. Central, and many others, who purchase of parties to whom we sell. We are supplying nine Car and seven Wagon Factories regularly. The above certificates express what our customers think of it. Special rates of freight to all points in the United States and Canada.



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We consider it superior to any Mineral Paint we have ever used or seen.
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It is the best as well as the cheapest Paint we have ever used.
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We think it superior to any in the market, and shall soon want another car load.
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Manufacturers of Sheet Iron Roofing,
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We find your Paint of first-class quality and very economical.
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Your Paint gives us entire satisfaction.
DULUTH & DUBUQUE BRIDGE CO.,
Duluth, Ia.

We like your Metallic Paint and shall continue to use it on our Sheet Iron Roofing.
SCOTT & CO.,
Manufacturers Sheet Iron Roofing,
Cincinnati, O.

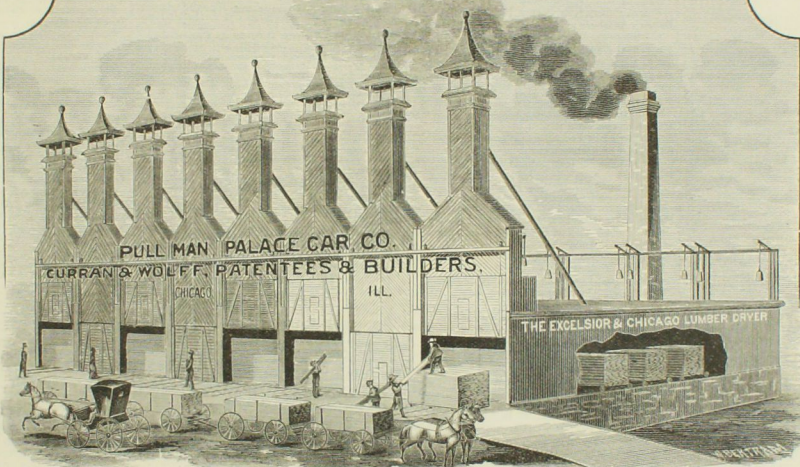
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I consider it the best Paint I have ever seen for all kinds of iron work, and is especially adapted for engines, boilers, and in fact, any kind of machinery.
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Wells & French Co., Chicago..... 3	Ohio Falls Car Company, Jeffersonville, Ind..... 2	Barney & Smith Company, Dayton, O..... 4
C. & N. W. Railroad, Chicago..... 3	Denver & Rio Grande Railway, Denver, Col..... 2	Missouri Car & Foundry Co., St. Louis..... 1
Flint & Pere Marquette R. R., Saginaw..... 1	I. S. Bell Car Stock Co., Chicago..... 1	Jackson & Sharp Co., Wilmington, Del..... 1
Pennsular Car Works, Detroit..... 1	Chicago, Burlington & Quincy R. R., Aurora, Ill..... 1	The Harlan & Hollinsworth Co., Wilmington, Del..... 1
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Especially Adapted for LOCOMOTIVE, CAR, ROLL-NECK and MACHINERY BEARINGS, and for Pump-Rods, Valves, Plungers, etc., for Mine Use where sulphurous water and acids are found.

LETTERS PATENT have not been taken out, so that any one using our goods runs no risk of being associated with any lawsuit. NO INTERFERENCE can be filed against the use of Ajax Metal on the contrary. Letters of recommendation from the leading steel and iron mills, foundries and machine shops of this country are shown upon application. Also reports of tests as made by MASTER CAR-BUILDERS and MASTER MECHANICS, who are acknowledged AUTHORITY. Full information given on application to

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HOOKS SMELTING CO.

PHILADELPHIA

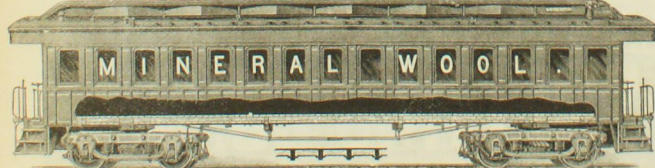
MANUFACTURERS AND DEALERS IN RAILWAY SUPPLIES.

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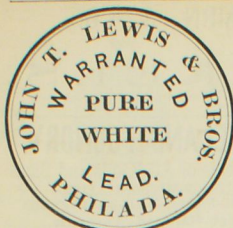
National Car-Builder.

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Westinghouse Air Brake Co., Pittsburgh, Pa.	i	Nater & Brayton, Cleveland, O.	vi	Roberts Loco. & Mach. Wks., Paterson, N. J.	xlii	Rochester Machinery Manufacturing Co.	
		Merry Car Wheel Works, Cincinnati, O.	vi	Schenectady Locomotive Works, N. Y.	xlii	H. G. Warner & Co., Chicago, Ill. (cover)	2
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Baugh Steam Forge Co., Detroit, Mich.	ix			Locomotive Tires:		Porter Iron Roofing Co. (cover)	4
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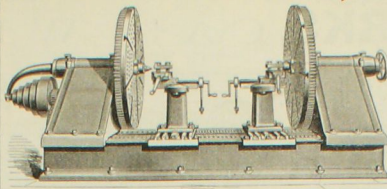
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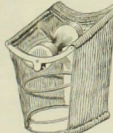
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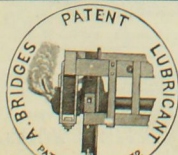
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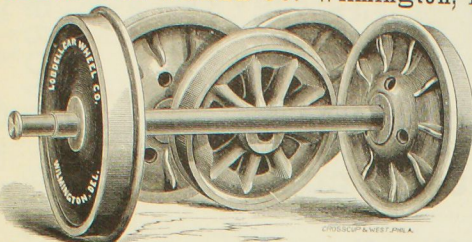
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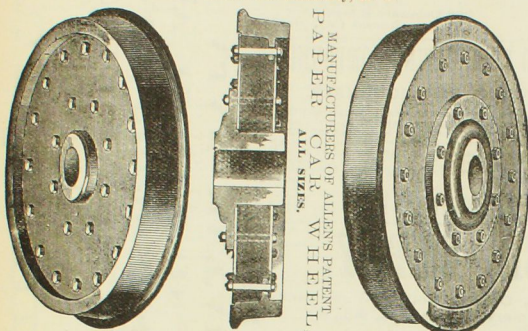
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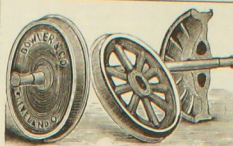
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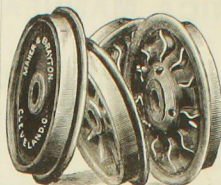


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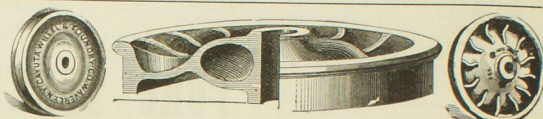
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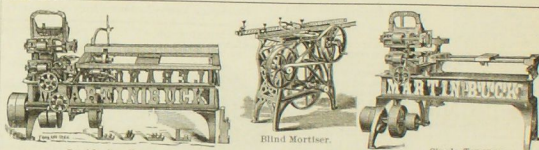


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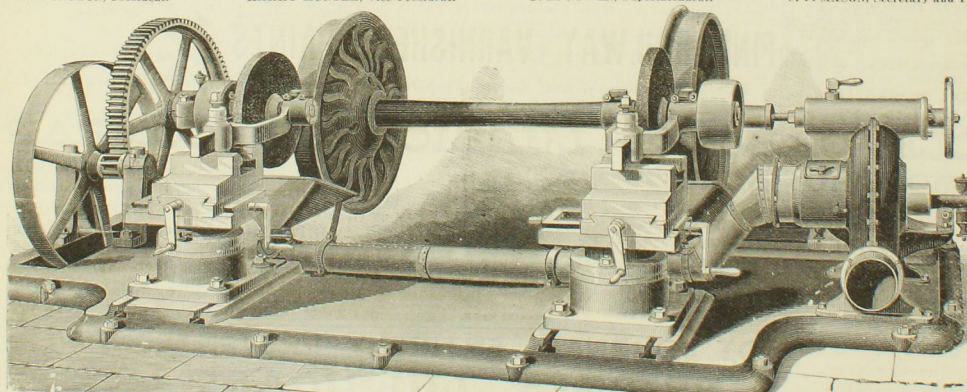
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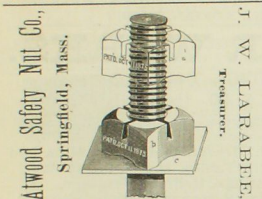
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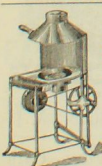
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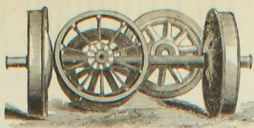


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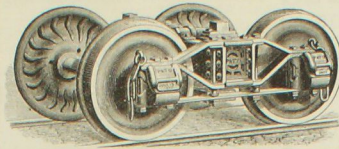
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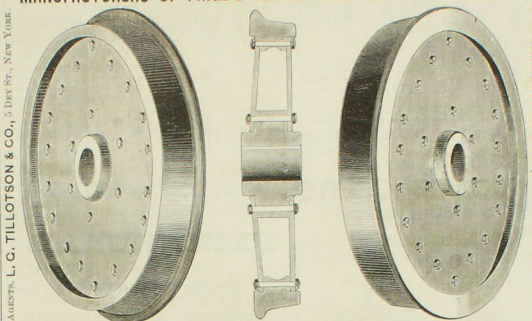
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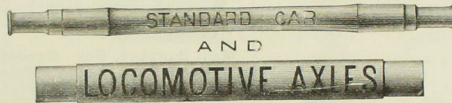
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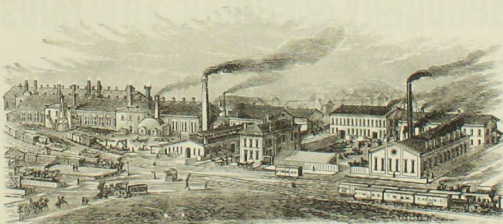
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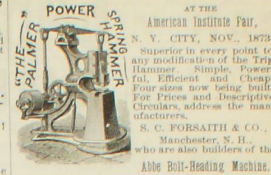
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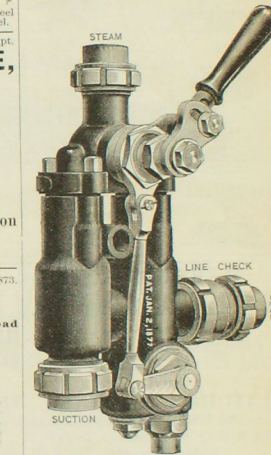


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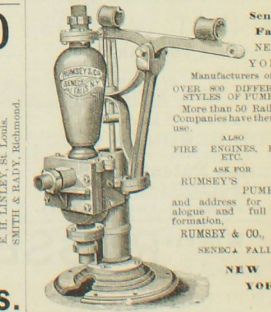
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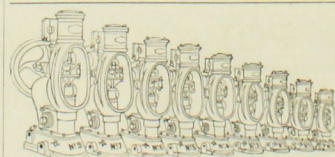
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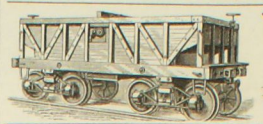
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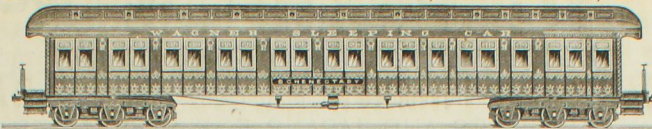
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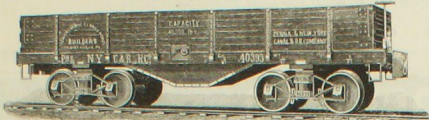
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POPULAR EXCURSION
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WHEELS
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For Freight, Locomotive, Truck, Tender, and Passenger Service, HAMMERED AXLES
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Capacity: 10 BOX-CARS PER DAY, 300 WHEELS PER DAY.
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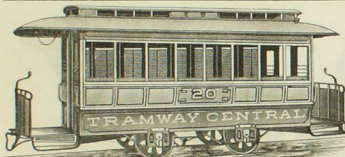
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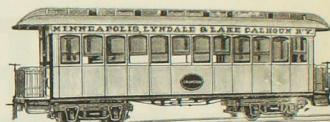


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Is the SUREST, the SAFEST, the MOST RELIABLE and MOST DURABLE process of painting Passenger Cars and Engines ever brought to the attention of Railway Managers.

We know very well that to talk of anything in this apparently boastful way is apt to invite distrust from practical men who measure the value of their adjectives, but

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It enables a Superintendent to know to a day just when he can expect his cars from the paint shop. It reduces the average time of painting. It supports the color and varnish better than any other method, and is more durable and more uniform, and no more expensive than any other good process. It is now in use on the leading trunk lines, and in the best shops.

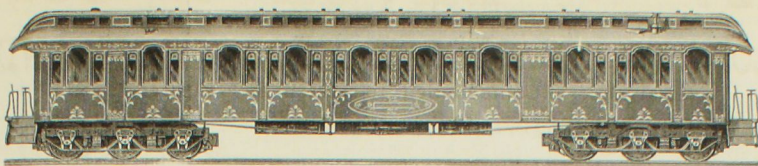
Send for our pamphlet, "How to PAINT," which describes the process at length.

MURPHY & COMPANY,

VARNISH MAKERS,

CANAL AND HARRISON STS., CLEVELAND, OHIO. 231 BROADWAY, NEW YORK CITY.

THE NATIONAL CAR-BUILDER.



DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

VOLUME XIII.
NUMBER 4.

APRIL, 1882.

SINGLE NUMBERS, TEN CENTS.
\$1.00 PER ANNUM.

Miscellaneous Items.

THE Youngstown (Ohio) Car Works are running full time.

A CAR COMPANY is proposed to be organized at Eau Claire, Wis., with a capital stock of \$300,000.

THE famous Tanner Brake case that has been so long pending has been decided in favor of the railroads.

THE Virginia Midland road is applying the Westing-house automatic brake to its passenger equipment.

THE forge shop of the Cole Manufacturing Company, Lake Village, N. H., is in operation night and day, turning out car axles.

THE Boston Stock Car Company, for constructing and leasing stock cars, has been organized. Capital, \$500,000.

MOORE, JONES & CO., St. Louis, manufacturers of car and engine brasses, intend doubling the capacity of their extensive works.

THE Pittsburg Locomotive Works Company, in Allegheny, is building an addition to its works, which will cost at least \$30,000.

THE Richmond, Fredericksburg & Potomac road has been very busy this season, and has run its locomotives an average of from 4,500 to 5,000 miles a month.

HILLIS & JONES, Wilmington, Del., manufacturers of special machinist's tools, especially for locomotive builders, have increased their capacity one-fourth.

A COMPANY with a large capital is being formed in Peterboro, Ont., for the purpose of starting a car factory. The town council has agreed to purchase \$20,000 worth of stock.

THE Shenandoah Valley Railroad Company has ordered 100 additional freight cars, 10 locomotives and 10 passenger cars, in preparation for their increasing business next summer.

SINCE the late disaster on the Hudson River Railroad, passengers all crowd into the front car, refusing to ride in the rear car. The Buffalo Express says the companies will probably leave that car off entirely.

THE Canada Tool Works, Montreal, have received an order for the complete outfit of machinery for the new car works at Kingston, Ont. This is the third order the company has on hand for new car works in Canada.

THE Pennsylvania Railroad Company is in want of 50 locomotives, and being unable to contract for their construction as soon as required, has concluded to double its force at the Altoona shops and supply itself.

THE shops of the Petersburg Railroad, at Petersburg, Va., besides doing all necessary rebuilding and running repairs, built last year 15 box and 10 flat cars. They employ about 30 men in both shops, and 15 engineers and firemen.

THE Capital City Car Works, of Columbus, O., have made an assignment. The cause is said to be a lack of capital to run the works to their full capacity. The assets are estimated at \$265,000 and the liabilities at \$150,000.

THE Portland Machine Company, Portland, Me., have ready for delivery to the Aroostook River Railroad, two 36-ton, 8-wheeled locomotives. This company is to furnish the Northern Pacific road with 34 locomotives of the same size.

A CAR wheel foundry is being built at Fargo, D. T., \$100,000 having been subscribed. Mr. P. E. Mulcahy, President of the Elkhart (Ind.) car wheel works will resign that position and manage the Fargo works, which are expected to be in operation by June 1.

THE Raoul journal box is being used by the Central Railroad of Georgia, and the whole Wadley system on freight and passenger cars, and on locomotive tender trucks. The first lot of them was made by the Ramapo Wheel and Foundry Company.

MR. G. B. NICHOLS, Master Mechanic of the Gulf, Colorado & Santa Fe road, has devised a spark-arrester, which is used on the locomotives of his road. It works so well that a flat car loaded with cotton can be carried in the train next the engine without danger of taking fire.

THE New Orleans & Pacific road is building car and locomotive shops at Westwego, La., opposite New Orleans, at which it intends to build its own cars and repair its rolling

stock. It has recently received 5 8-wheel and 5 10-wheel locomotives from the Pittsburg Locomotive Works.

THE Chesapeake & Ohio Road has recently received 10 passenger locomotives from the Danforth Locomotive Works. They have 17 x 24 cylinders and weigh about 43 tons. The same works are building 10 consolidation locomotives for delivery to this road the last of the summer.

THE Port Royal road has an Allen slide in a freight engine having 16 x 24 cylinders, and 44 ft. drivers. It makes the engine not only smart, but able to do its work with the valve cutting off shorter; and consequently it uses less steam and burns less wood than it did with an ordinary valve. It does most of its work in the 7-in. notch.

THE Parrott Varnish Co., of Bridgeport, Conn., report that they have a product of 1,000 gallons per day. The increase of their business has been such as to render necessary large additions to their storage capacity, which is now sufficient for 100,000 gallons, thus enabling them to give their stock the proper age.

THE Walpole Emery Mills, of Boston, Mass., sold during 1881 in round numbers, 1,300 tons of manufactured emery, which is over one-third of the entire sales of this product in this country during the year. These mills claim to produce a strictly superior article of emery, and these sales are a verification of the claim.

THE Canton (Ohio) Car Company announce that they are prepared to contract for the building of freight cars of every description. Their works are new, with a capacity of ten cars per day. The officers of the company are: J. W. Underhill, President and Treasurer; A. Housel, Secretary; G. H. Pratt, Superintendent.

THE car and locomotive shops of the Carolina Central road, at Laurinburg, N. C., employ 63 men. Besides current repairs, they built last year one combination baggage, mail and express, 30 box and 30 flat cars. They are now building some stock cars. The road is very busy and the engines are worked with double crews.

THE shops of the Houston & Texas Central road, at Houston, are well equipped with machinery of the latest improved patterns. During the last year, besides repairing over 2,000 freight cars, they have built over 100 new ones, and rebuilt 29 coaches, 7 mail, 10 baggage and 7 sleeping cars. They are now building 2 freight cars a week.

A NEW firm, under the title of the Southern Railway Supply Company, has recently been formed in Richmond, Va. The managers of the concern are T. L. Courtney, Jr., and Geo. B. Gaines, formerly connected with Smith & Rader. The company will make a specialty of railroad, machinists', miners' and steamboat supplies.

THE Georgia Railroad has recently received a standard 8-wheeled locomotive from the Baldwin Locomotive Works. It has 16 x 24 cylinders, 56-in. driving wheels, and weighs in working order 67,000 lbs.—25,000 on the trucks and 42,000 on the drivers. The boiler is 49 in. outside diameter. The same works are building 8 more for this road.

COL. HOXIE, General Manager of the Iron Mountain & Southern road, has given orders to have all supplies intended for the sufferers by the overflow of the lower Mississippi transported free over his road, and has also directed that persons moving their household goods from their flooded homes to points on the road shall have them carried free.

THE Galveston, Harrisburg & San Antonio road, since the destruction of its shops at Harrisburg, by fire last August, has built new ones, consisting of a car shop 250 x 60, a foundry 130 x 56, a blacksmith shop 100 x 40, with 10 fires, a round-house with 8 stalls 67 feet deep, a shed 288 x 36, with two tracks for repairing freight cars, and a store-room 90 x 36.

THE new station of the Pennsylvania Railroad Company at Harrisburg is to be modeled after a railroad station that Col. Thomas A. Scott saw while in Nice. It will be oblong in shape, 800 feet long, and open in the center. The grounds will be beautifully laid out, and filled with fountains, statuary and shrubbery. The plans are in the hands of the Board of Directors.

It is said that certain kinds of wood, although of great intrinsic durability, act upon other woods of equal durability in such a way as to induce mutual destruction. Ex-

periments with walnut and cypress, and cypress and cedar, prove that they will rot each other while joined together, but on separation the rot will cease, and the timbers remain perfectly sound for a long period.

THE Paige Wrought Metal Car Wheel Co., Springfield, Mass., are supplying their wheels to a number of the leading railroads of the country, including the New York Central; Connecticut River; Southeastern; New Haven & Northampton; and Central of New Jersey; also the Wagner Sleeping Car Co.

It is said that iron rails properly made will last as long as steel rails. In the track of the Cincinnati, Hamilton & Dayton road, near Dayton, O., are iron rails placed there 31 years ago, and they are yet in good condition. They were made at Johnstown, Pa. We copy this from a Western exchange. If the statement is true, would like to have a responsible voucher for it.

THE Jones Car Manufacturing Co., of Schenectady, N. Y., have just completed the enlargement of their works, and are now employing 400 men. The work now in progress at the shops includes six elegant Wagner sleeping cars, some first-class coaches, smoking cars, etc., for the Mt. McGregor & Lake George narrow gauge road; also passenger coaches for sundry other roads, and a large number of street cars.

THE shops of the North Carolina Division of the Richmond & Danville Road, at Company's Shops, N. C., employ over 100 men, and in the summer season they build an average of one freight car a day. Last year they built 150. They have just turned out a mail and baggage car, which is 42 ft. over the sills, and are now working upon a lot of 10 4-wheeled cabooses, 8 ft. wide and 20 ft. long over the sills.

AN inventor claims to have produced a railroad switch that can be operated by levers controlled by the engineer in the cab of a locomotive, by which the switch can be successfully closed or opened when a train is running at the rate of sixty miles an hour. The levers operate on a balance wheel between the rails opposite the switch in such a manner that the shifting rails can be moved either way at the will of the engineer.

THE Pennsylvania Railroad Co. has matured a system of passes for employes, by which they can travel without charge between the place where they work and the station nearest their residence. The pass tickets are similar to those issued to commuters, but can not be used on Sunday; and if found in other hands than those of the man to whom they are issued, they will be canceled and the man discharged from employment.

A PRIVATE car recently built by the Barney & Smith Manufacturing Company for the Chicago, Milwaukee & St. Paul road is spoken of in enthusiastic terms by those who have seen it. It is painted a deep rich brown, and is finished in gold, with silver-plated railing, handles, corners, etc. It contains parlors, a library for writing, etc., sitting room, sleeping rooms, kitchen, dining room, and all improvements known to modern car builders.

THE total length of railroads reporting to the Massachusetts Commissioners for the year ending Sept. 30, 1881, was 2,754 miles of main line and branches, of which 684 were double-tracked. The average cost of standard-gauge roads is returned at \$38,766 per mile; the cost of equipment per mile operated averages \$8,260, making the total average cost \$46,027. The cost of narrow-gauge roads averages \$26,435 per mile, with \$5,230 per mile for equipment.

THE car shops of the Eastern Railroad, Salem, Mass., have just completed a new passenger car which has attached to it a model fire extinguishing apparatus worked by an air cylinder placed beneath the car; and a hose connected with the tank enables the operator to direct a stream to any part of the interior of the car. The first six of twenty new cars to be built by the company are completed. Their interior finish is California redwood.

A ST. LOUIS paper says that M. M. Buck & Co. of that city have recently completed a locomotive which has about one-tenth of the usual complicated machinery of other engines, and that the various parts are less than half the number ordinarily used. It is for a railroad in Louisiana, and is capable of pulling three standard-gauge coaches over the steepest grade. The cylinder is 7½ inches in diameter and 14 inches stroke. The cost of the locomotive is \$20,000.

THE Charleston & Savannah road has just received four locomotives from the Rogers Locomotive Works, Paterson, N. J. Two have cylinders 15 x 24 in., and 63-in. drivers, and the other two have the cylinders of the same size, and 50-in. drivers. This road is building a new iron bridge over the Savannah River, at a cost of \$100,000. The foundations, built under the supervision of Mr. Chas. Sooy-Smith, are completed, and the bridge will be erected by the Clark Bridge Co., of Baltimore, Md.

THE Florence, S. C., shops of the Wilmington, Columbia & Augusta road, built last year 1 first-class passenger coach at a cost of \$4,000, 2 box cars costing \$625 each, and 31 platform cars at \$975 each, besides 37 flat and 3 box cars for the Northeastern road. These shops employ 180 men, and are able to build ten freight cars a week. They are now building 1 baggage and 2 postal cars 50 feet long over sills, and of the latest government pattern; also 8 flat cars 35 feet long, and 120 box cars 33 feet long.

THE well-known firm of Wilson, Walker & Co., of Pittsburgh, manufacturers of railway car and locomotive forgings, has recently reorganized as a limited partnership, with John T. Wilson, James R. Wilson and John Walker as general partners, and Andrew Carnegie as special partner, and the firm name hereafter will be Wilson, Walker & Co., limited. During the past year extensive additions have been made to the company's works, and its product has been greater than ever before.

THE Savannah, Florida & Western Railway is receiving 10 locomotives from the Rogers Locomotive Works, 8 of which are the American pattern and have 16 x 24 cylinders and 5-ft. drivers; 2 are moguls and have cylinders 17 x 24. The Baldwin Works have a contract to build 15 more for delivery next fall and winter. The road has also received six day coaches from the Gilbert & Bush Co., two parlor cars from the Wason Manufacturing Co., and two Leighton sleeping cars from the Jackson & Sharp Co.

THE new foundry, machine shop and other additions to the Manchester shops of the Richmond & Danville road are nearly ready for the new machinery. The buildings are of brick with slate roofs. The foundry is 80 x 130, with a wing for brass work, and is one of the largest in the South. The machine shop, 70 x 130, is for the car department and has a wing for the boiler rooms and a new 60 horse-power Corliss engine. The present force is 300 men, which will be largely increased when the new shops are in full operation.

THE organization of the McQueen Locomotive Works, at Schenectady, N. Y., has been completed, and orders for the principal machinery placed. Mr. Walter McQueen, for many years superintendent of the Schenectady Locomotive Works, is vice-president and general manager, and Mr. Walter A. Jones, president of the Jones Car Works, is also identified with the new enterprise, the capacity of which will probably be 12 engines a month. It is the expectation to begin delivering engines in the course of the present year.

THE *Railway Advance*, referring to the offered prize of \$5,000 by the American Humane Society for the best stock car, and that none of the 400 models presented came up to the mark, suggests that if the comfort of cattle is deserving of so much solicitude, whether it would not be well for the Society to give some attention to the comfort of railway brakemen, by the offer of a liberal prize for a car coupler that will meet the requirements of freight service in the prevention of accidents. The suggestion is a pertinent one.

THE Boston *Daily Advertiser* describes a very successful trial of the capacities of the Salmon Hot Water Heater, of which we gave some account in our last issue. The trial was made on a train of the Boston & Albany road, under the direction of Mr. F. D. Adams, the general master car-builder, and Mr. W. H. Barnes, the division superintendent. One car was equipped with the Salmon apparatus, and another with a water heater of a different kind, the former proving its superiority both with respect to the heat supplied and the amount of fuel consumed.

THE St. Louis & San Francisco road has 500 cars equipped with the American Brake Co.'s automatic brake; 302 of this number that had been running with the brake from one to twelve months were recently inspected in St. Louis, when it was found that only two of them required any important repairs to the brake, and that only 61 of the number needed hand repairing, such as the tightening or renewal of nuts and bolts. In all but four instances the necessity for these slight repairs was owing to a careless application of the brakes when first put on the cars.

THE statements and testimonials contained in a recent circular of the Chilled Car Wheel Grinding Co. furnish renewed evidence of the value of its method of treating car wheels. The economy of having wheels, both new and old, perfectly true in circumference, is becoming better understood every day, and it is only necessary to use one of the machines of this company to be convinced of the immense saving that can be made in the prolonged life of wheels, and in diminishing the number of removals in a given time and for a certain amount of rolling stock.

A NEW plan for the stowage of animals in cattle cars is reported from Iowa. It consists of supporting each animal, say cattle and horses, with a wide girth made of stout sail cloth or bagging, which is passed under the body and

held in position by having the four corners attached to chains running across the car and held to the sides by hook bolts about five feet from the floor. In this way the animals receive sufficient support to relieve the weariness of standing, and occupy less room than if permitted to lie down. The cost of the necessary fixtures is about \$31 per car.

THE cattle palace cars of the New York Line Stock Express Co., some of which made a trial trip a few weeks ago on the Central of New Jersey, will soon begin running on the New York Central & Hudson River road. It is claimed that cattle can be brought through in these cars from Chicago in 48 hours, and even less, instead of occupying five or six days. The company expects to make its profit by the saving in shrinkage, which now averages about 100 pounds per head. This, it is claimed, can be reduced at least one-half, which will be equivalent to from three to five dollars for each animal.

MR. P. J. COCHRANE, master of machinery of the South Carolina R. R., has patented a steel rail crossing, with cast iron or steel chairs, which can be made to suit any angle of crossing. The chairs are a novel pattern, constructed to support the head of the rails as well as to hold the main and guard rails firmly against all strains without rivets. It is free from joints except at the intersection of the rails, and is easily taken up for repairs or changing rails. One in use seven months at the most frequently used crossing of the road has proven very satisfactory. A collision of trains upon it did not injure it in the least.

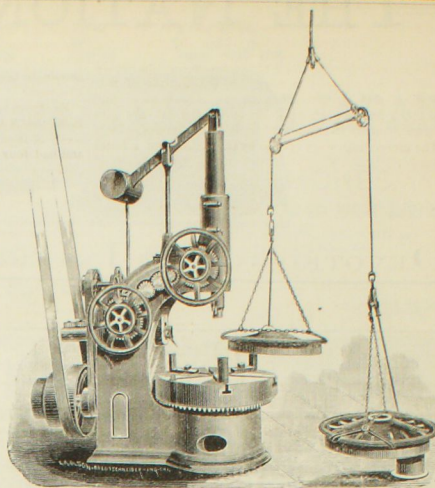
THE Fitchburg Railroad Co. is remodeling a passenger car into a wreck car for the comfort of their workmen at wrecks. One end of the car will be fitted up as a cook room, furnished with a sink, counter, case of drawers, and a cooking range with large oven. The remainder of the car will contain seats as an ordinary passenger car, covered with green plush. There will be tables hung on the side of the car, which will be dropped down between each pair of seats, so that four workmen can sit and eat at each table. The car is 45 feet long, and its exterior is like an ordinary car.

AT the Whistler (Ala.) shops of the Mobile & Ohio road, one elegant passenger car has just been completed which compares favorably with those built at northern shops—and why not? The interior work is ash and beach walnut oiled; the roof is decorated in Japanese style and the seats are covered with red and green plush. The dressing rooms are completed with mirrors, hand pumps and all the most modern paraphernalia of the dressing room. Solid panels take the place of end windows, and a new patent ventilator is placed at each end of the car by which air is admitted through gauze, excluding dust and cinders.

THE Seaboard & Roanoke road has 21 locomotives and 881 cars, employs 108 men, including engineers and firemen, in the rolling stock department, and is building at the Portsmouth shops a standard freight locomotive with 16 x 24 cylinders, 54-inch drivers, boiler 48 in. diameter, and which will weigh in working order 33 tons. Its standard passenger engine has 14 x 24 cylinders, 5-foot drivers, and weighs 30 tons. Its standard length for freight cars is 32 feet, and 7 x 34 journals are used. The road has no stock cars proper; the box cars being used as such by having ventilators in the sides and ends and two doors on each side, one tight and the other grated.

THE South Carolina Railroad is building, at the Charleston shops, a standard first-class coach 48 feet long over sills. The inside finish, including seat-ends, is in ash; the headlinings are canvas neatly painted in light colors. Three Hicks & Smith double-burner lamps are used, and two Spear heaters. The outside of the car is painted with Prince's metallic paint instead of lead, and finished with Indian red ground in Japan. The corners, door posts and letter boards are ornamented in tasteful designs in gold and black. The trucks have the Raoul journal box, with stop on inside of lid to take the end-thrust, the lid being held down by a strap. The usual collar is on the axle, which is M. C. B. standard; spread of wheels, 7 feet.

GEN. G. M. DODGE, of New York, a representative of the Gould system of railroads in the Southwest and Mexico, has bought and shipped to the various roads during the past year over 100 new and 11 second-hand locomotives. Of these, 5 eight-wheel and 30 ten-wheel, with 48-inch boilers, 17 x 24 cylinders, and 56-in. drivers, were bought of the Pittsburgh Locomotive Works; 35 eight-wheel, 10 having 56-inch and 25 60-inch drivers, were bought of the Danforth Locomotive Works; and 15 eight-wheel of the Schenectady Works. The eight-wheel engines, 55 in all, were built to standard drawings and specifications of the Texas & Pacific Railway, with 16 x 24 cylinders and weighing 34 tons; 7 more, from Schenectady, have 17 x 24 cylinders. Gen. Dodge is also having 40 additional locomotives built in Holland and Germany for this year's delivery, as it was impossible to get all he wanted built soon enough in this country.



CAR-WHEEL BORING MACHINE.

THE cut represents an improved car-wheel boring machine designed for use in locomotive and car shops. It is provided with an automatic facing arrangement, by which the hubs of wheels can be faced off at the same time that they are bored. The transverse slide which carries the facing tool is operated in the same manner as the boring bar, which is by a rack and pinion driven by friction. The machine is built without the cross-feed, or facing arrangement, for car shops, where the hubs of the wheels do not need facing; is very powerful, has large cones driven by a five-inch belt, and has four changes of feed, the finest $\frac{1}{16}$ and the coarsest $\frac{1}{4}$ of an inch, the others being intermediate. The facing feed is finer, but will face up the hub and be backed before the cut is through the wheel, so as to be entirely out of the way. The machine has also a patent hoisting arrangement, by which the weight of the finished wheel is utilized to place the one next to be bored in place, exchanging them simultaneously, and thus saving time and labor. A dozen wheels have been bored in an hour by this method, the cores being 44 and the holes bored 44 inch, making a smooth hole and easy to fit. Three of these machines are in use at the shops of the Chicago & Northwestern Railway, one of them having been used nearly two years, and all giving entire satisfaction. They are manufactured by John Featherstone, of the Columbia Iron Foundry & Machine Tool Works, 16 Front street, Chicago.

DURING the last year the shops of the Chicago, St. Louis & New Orleans road, at McComb City, Miss., besides rebuilding one coach and repairing 4,078 box and flat cars, built 4 coaches, 5 express, 31 box, and 163 flat cars, and one steam shovel. The express and flat cars are 40 ft. long. The coaches have bodies 45 ft. long, are finished inside with black walnut, bird's-eye maple and ash in Queen Anne style, lighted with two double lamps and heated with one stove in the center of each car; the outside is painted yellow with a gold stripe shaded with brown. Their box cars have oak end sills and cross-frame tie-timbers, and the rest of the frame of southern pine; they are sheathed with northern white pine and roofed with tin.

THE Wilmington & Weldon R. R. Co. built last year, at Wilmington, N. C., a machine shop 50 x 140, and an erecting shop 70 x 140, for car work; also a round-house of 20 stalls. This year a new locomotive shop 70 x 350 is to be built on the site of the old one, including machine, erecting, boiler and blacksmith shops, all under one roof. The shops employ 184 men. Last year 10 stock cars were built, costing \$5,435; 6 platform cars, costing \$2,280, and one locomotive, costing \$8,439, the largest one owned by the company. Its cylinders are 15½ x 24, drivers 5 feet, and weight 75,300 lbs. The company has always built its own cars, and with the increased facilities of the new shops can turn out 25 cars a month, and also build its own engines. The box cars of the road are 33 ft. long by 9 ft. wide over sills.

A BUILDING is being fitted up at Hornellsville, N. Y., under the auspices of the New York, Lake Erie & Western road, with an apparatus for instructing brakemen in the operation of the air-brake. A set of air pipes, equal in length to what is required for a passenger train of twelve cars, is laid at a height of about six inches from the floor, and three air-brake cylinders are connected with the pipes. The air pump is fastened against the wall, and is operated by steam, which is carried through a pipe from a locomotive in the round-house. The model is perfect in all points, and its workings can be illustrated as clearly as if the brakes were attached to a train. It is believed that, by familiarizing brakemen with the apparatus, accidents, due to ignorance of the working of air-brakes may be averted.

Car-Builders' Monthly Meeting—Iron and Steel in Car Construction—Dead-Wood Blocks.

The subjects for discussion at the March meeting, at the rooms of the Association, were the substitution of iron for wood and steel for iron in car construction; and whether a pair of dead-wood blocks on freight cars give greater security to trainmen than a single bumper block.

The proceedings were opened by the reading of a letter signed "Progress," in which the business of the Cleveland Rolling Mill Company was referred to as illustrating the growth of the steel interests in this country. Twenty years ago, that establishment employed 250 men in the manufacture of merchant iron and iron rails, while to-day 6,000 men were employed in the making of steel rails, steel wire, steel boiler plate, steel shovels and other products that were formerly made of iron. Steel wire-nails and brads were now extensively used in passenger car work, and the question was beginning to be asked whether steel can not be used for the channel-bars of freight-car trucks. The writer knew of no reason why steel could not be used to advantage, instead of iron, in car work.

Mr. Forney referred to the fact that steel was taking the place of iron in many kinds of construction, and especially locomotives. In England a great variety of special forms were used in steel forging; die-forging was more in use than in this country, and plate steel was pressed into almost any shape, so as to be adapted to a great variety of purposes. This kind of forging, if more extensively introduced here, would lead to the substitution of steel for all parts of cars where iron is now used, and making such parts lighter or else stronger with the same weight. It was also probable that the price of steel in future would not be any higher, and it might be even lower than a good quality of iron.

Some conversation then followed in regard to the practicality of making truck frames of steel. It was suggested that the great objection to the use of steel for this purpose was its want of uniformity.

Mr. Howard Fry said that steel axles were very much used on the Pennsylvania Railroad, and were not only considered superior to iron, but equally as cheap. They lasted longer, and were less liable to break. He had no data to confirm this, but such was the opinion of those who were best able to judge of their performance on this road. With respect to the use of steel for the minor parts of cars, he had no doubt that the experience of some car-builders was adverse to the use of steel rails.

Mr. C. E. Garey had found that steel screws and steel wire nails were cheaper and better than iron.

Mr. Marden, of the Fitchburg road, had not used steel screws and nails long enough to form an opinion as to results; neither had he any very definite views in regard to the entire substitution of iron or steel for wood as a material for cars. He thought, however, that a combination of wood with these metals was very much better than the exclusive use of either.

Mr. W. A. Foster, of the Fitchburg road, was using steel for locomotive crank-pins and connecting rods, and also for tubes. Had not yet seen steel used for links, but had no doubt it would be used for that purpose.

Some conversation followed as to whether a plain steel nail would not hold as well as a barbed nail, but nothing definite was elicited except that a plain nail would hold the best when driven into the ends of wood.

Mr. Fuller, of the U. S. Tube Rolling Stock Co., referred to some iron tube cars recently exhibited at Troy, and the criticisms of them that had been made by car-builders and others. The form of construction had been changed somewhat, and as soon as the specifications were completed, he thought a car could be shown that would combine all the advantages to be derived from iron as a material for the construction of cars. We have, said Mr. Fuller, no cast iron about the car, nor any combination of iron and wood. We take a channel iron end-sill, and that in connection with tubes which are forced against the inside of the end-sill and drawn together by iron rods running through them, form a rigid framework. Between these tubes, over the truck, we form a bolster by the use of channel iron and malleable iron. We hold these tubes in relation to each other, fixed one above another by malleable iron castings. We are now making a chamber from the center of the car to the end-sill, with the tubes fixed to each other, so that there can be no possibility of the car buckling forward in the center. We are trying to build an iron car that will not exceed the expense of a wooden one with the same capacity. I think we have succeeded in doing this. What all are endeavoring to reach is the maximum strength with the minimum weight. The only thing that stands in our way is the expense. If we can reach the point we are aiming at we can give you a car that will carry the load, that will have the capacity, weigh less, and cost as little or very little more than your present car. We have now an order from the Pennsylvania Railroad and one from the Philadelphia & Reading to build them some cars to demonstrate this theory. We are simply introducing a car body, and we believe that wrought iron and malleable iron combined will solve the problem.

Mr. Marden thought there was one thing which car-builders usually lose sight of to a great extent in the construction of cars either of wood or iron, and that was the expense of repairs. His experience was that the first expense of a car is not by any means the whole expense to the company during its life. Very often repairs exceed several times the original cost. This was a thing which should be borne in mind by those who are constructing iron cars.

Mr. Forney spoke of some coal hopper cars built by the Baltimore & Ohio road 25 years ago. They were exclusively of iron, except the longitudinal and cross timbers, and had four and six wheels; and 2,500 of these cars were now in use.

Mr. Packard, of the B. & O. road, said the cars now in use were 8-wheel cars. The trucks were entirely of iron. The cars gave universal satisfaction, and it was in contemplation to build more of the same kind.

Mr. Fuller said that by the method proposed by him the parts could be made interchangeable, and so facilitate repairing. The wrought iron could be straightened in case of an ordinary accident, and a section taken out and another section put in; and that as a rule iron cars would go into a wreck and come out in a better condition than wooden cars do. And furthermore, the material of an iron car when worn out, was worth more than that of a wooden car.

Mr. Fry spoke of some iron box cars built 20 years ago for the New York Central road, and which were running now. They had been represented as being badly designed and built, and worse taken care of. Carpenters, it was said, accustomed to the cleanly atmosphere of car shops, hated to be turned into iron workers and tinkers, and had those cars been constructed by iron men instead of wood-workers, they would have been far better than they are. The fact still remained, however, that the cars were still in service, and 20 years old.

Mr. L. Garey was unable to give the age of the cars referred to by Mr. Fry. They were made by Mr. John Mc B. Davidson, in 1863, were badly designed and not well constructed, and have been a great annoyance to the men in the shops, as they are frequently out of order and have of late been rebuilt, wood being substituted for iron more or less. They are unfit for carrying grain. At present there are but few on the road.

BUFFER BLOCKS.

Mr. Forney spoke of the difficulty of deciding as to the comparative merits of single and double blocks. The Erie road, and all the Pennsylvania lines, used double blocks, while the New England roads, the New York Central, and most of the roads centering at Chicago, used single blocks. To change either of the two systems would be very expensive, and he thought a modification might be agreed upon by bringing the double blocks nearer together, and lengthening the single blocks, so as to prevent interlocking. Or, if the Car-Builders' Association would agree upon a standard length for single blocks, and a standard distance for double blocks, it would be less dangerous for the men who go between the cars.

Mr. Marden was not a convert to the single block. He had always believed in the double block, but not in the shape of the old "man killers," from the fact that it is a positive protection to brakemen by keeping the cars a certain distance apart. With a double block he claimed that the draw-bar head can be arranged to project so that when it is crushed together, the elasticity of the spring may be taken up, and then the force of the concussion will strike on the dead-wood blocks. You can not arrange a draw-bar in that position with a single block. You have got to let it project far enough beyond the single block to break the springs, or break the draw-bar, and spoil the draw-bar timbers and drive it under the car. He was putting on a single block, 30 in. long, which he thought was the standard adopted by the convention. But still he was not yet a friend to it.

Mr. Fry had heard car-builders at the West say, that owing to the increased weight of cars, single blocks would not stand the service they were subjected to.

Mr. C. A. Smith said there was no question that two blocks were an additional protection to the cars. Most trainmen preferred single blocks, so far as the handling of a train was concerned; but double blocks were the safest, because when they came in contact there was more room left between the end timbers of the cars.

Mr. Mileham, of the Erie road, had put double blocks on a great number of both new and old cars, and preferred them to single blocks for the reason that they saved the cars, and at the same time protected the men. He set the draw-heads so as to project 1 1/2 inches beyond the blocks, so that when the springs were compressed this much, the blocks were brought in contact, and there was then 21 inches of space between the end timbers for the men to stand in. The yard men felt perfectly safe when coupling Erie cars. By this arrangement you saved the springs, the draw-heads and the men.

Mr. L. Garey suggested that there was one point with respect to double blocks that had been overlooked. In coupling with four blocks, the arm of the man is liable to be caught between the blocks while guiding or dropping the pin, inasmuch as he must reach under or over the link in order to keep clear.

Mr. Fry said that the instructions given to the men on the Philadelphia & Erie road were to stoop low and hold up the link from the under side, keeping their heads lower than the sills.

Mr. Mileham said they could not well do otherwise, for

the reason that the blocks on that road were so far apart that the men could not couple from above without reaching two feet or more. With the Erie arrangement, the men could use one hand underneath to guide the link, and the other above to drop the pin, while the entire mouth of the draw-head is below the blocks.

Mr. Marden said that the upshot of the matter was that we had got two different systems, and he did not believe all the roads could ever be converted to the single block system, and that consequently the sooner there was some approximation to uniformity the better. The superintendent of the Fitchburg road had furnished the brakemen with coupling-sticks to be used on the different kinds of cars coming into the yards and having different buffer blocks.

Mr. Peter Smith, of the Hudson River R. R. shops, said he got about 250 sticks about a year ago, furnished by order of the management. He gave out about 150 of them, and to-day there was not a stick used in the yard. All the fingers that had been injured in coupling had been caught between double blocks.

Mr. C. A. Smith hoped the committee on draw-bars would recommend at the next annual meeting that all buffer blocks be placed a certain distance apart. This would be one point gained. It would then remain for the roads to change the blocks accordingly, and he had no doubt they would do it.

Mr. Forney was of the opinion that two standards would have to be adopted, one for a single and one for a double block.

Mr. Peter Smith said some new cars had recently come into his yard with blocks 15 inches long and 11 inches wide, with a cast-iron plate on the end. The cars of another road had dead-woods 4 ft. 4 in. long, with 5x8 in. blocks attached to them, leaving a distance of 2 ft. 8 in. between the blocks, so that the blocks of his own cars would interlock with them every time they came together.

Mr. Marden would not be surprised if some of these cars belonged to the Fitchburg road. These attachments were being taken off, however, as fast as possible. He hoped if any recommendation was made at the car-builders' convention, single dead-woods would not be mentioned at all.

California Redwood Timber.

Along the California fog belt, from the Oregon boundary to Santa Cruz, redwood is plentiful, the belt being some twenty miles in width, and fringed by an interior range of fir and pine-topped hills. Fogs and redwood trees are, from the nature of things, boon companions through the coast district, and the trees are more plentiful and luxuriant in the rich valleys and shaded ravines, the conditions of soil and atmosphere in those places best encouraging the growth. The river bottom lands being particularly marked by excellent and heavy timber, and the ridges showing a smaller and more scrubby development, while for the most part the summits of these typical elevations, where adjacent to the ocean, are barren of redwood, pine or thick undergrowth being indigenous to this soil. A large sprinkling of Oregon pine diversifies the character of these thick redwood belts, and an abundance of underbrush forms a part of the native vegetation, the rays of old Sol being almost entirely shut out by alders, ferns, brakes, etc. When compared with other forests, largely esteemed of remarkable size, the redwood towers above them in height like the Brobdingnagians, who harassed the pigmies in the travels of Gulliver. Their growth is apparently the most wonderful in the scope of American observation, if we leave unconsidered the mysteries of South American forests, the uniformness of the extraordinary height being a feature of the redwood. From ten to twenty feet in thickness at the base, they reach upward to a height of 300 or 350 feet, and grow closely together. The yield averages from five to ten times that of the most flatterling trees in the noted Eastern and Northern woods, upward of 100,000 feet being obtained from a single redwood tree, incredible as the claim may appear. The logs average readily from seven to nine feet in diameter, and are often nearly or quite fifteen feet, and in such cases are too ponderous for removal before splitting. The lumbermen have thus far touched merely upon the borders of the forest, the unnavigable streams preventing a successful encroachment upon the body of the timber, but the railroads will now enable the men to direct their campaign beyond the margins of the forest.

But while no immediate fear of exhausting the redwood can be felt, a very important problem is presented in connection with it. It is calculated that a century's warfare upon the timber would sweep it away, and how to reforest the belt is the prodigious conundrum. Observation and scientific applications of accepted theories make many of these huge wood monarchs 1,000 years old and upwards, and their vitality or reproductive power seems to have waned, since they cannot send forth shoots, and the idea of raising from the seed is not known to be a practical one.—Cor. N. W. Lumberman.

PROFESSOR HUXLEY says that nothing that man can do in the ordinary way of destruction will ever appreciably diminish the stock of herring in the sea. It is the same when some people go fishing for bass. They never reduce the stock a particle, not even when they spit on the bait.

ENGINE AND TENDER TRUCKS OF PASSENGER LOCOMOTIVE No. 137, CHICAGO & ALTON RAILROAD.

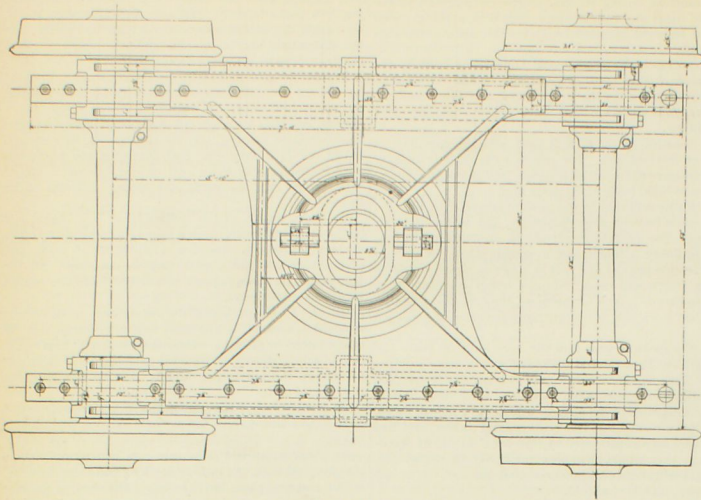


Fig. 1.—Plan.

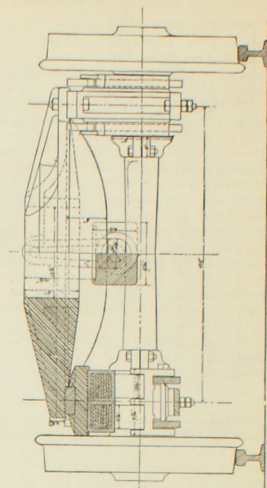
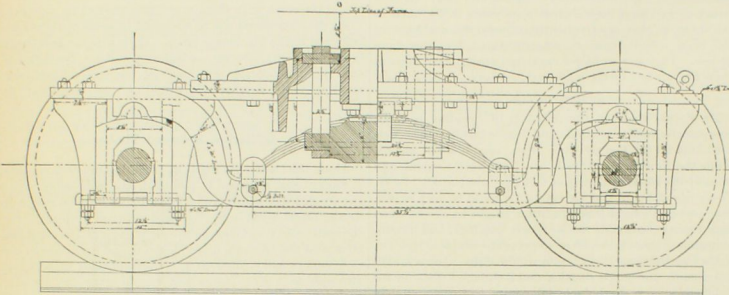
Fig. 6.
Transverse Section and End Elevation.

Fig. 2.—Longitudinal Section.

Side Elevation.

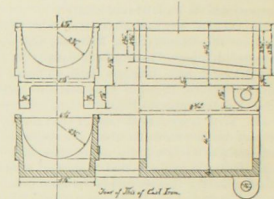


Fig. 7.—Oil-Cellar.

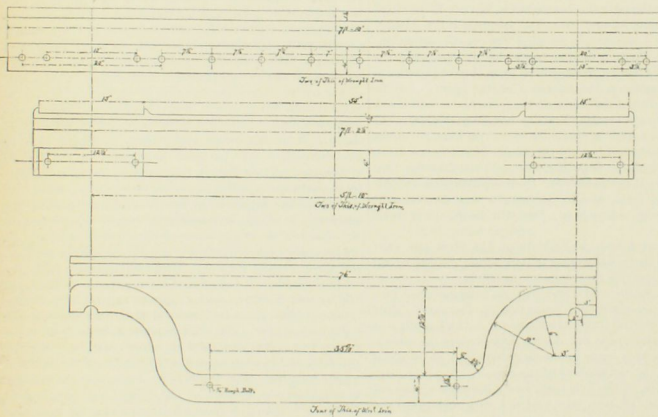


Fig. 3.—Upper and Lower Frame-Bars and Equalizer.

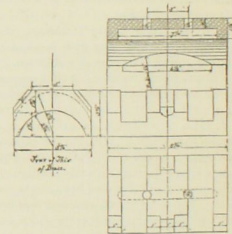


Fig. 8.—Journal-Bearing.

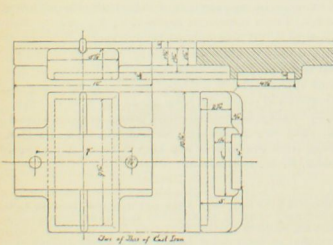


Fig. 4.

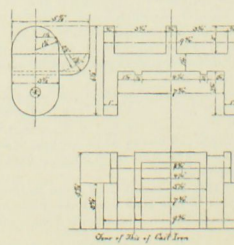


Fig. 5.

THE engravings on this and the opposite page are in continuation of the illustrations of the Chicago & Alton engine, No. 137, begun in our March number. They show the construction of the engine and tender trucks in detail, so that but little description is necessary.

The engine truck, Figs. 1 to 10, is 4-wheeled, with a swing motion center-bearing. A very large cast-iron deck or bolster, well strengthened by ribs, is planned, fitted and bolted to the upper frame-bars by sixteen $\frac{1}{4}$ -in. bolts. Fig. 1 shows a plan of the truck; Fig. 2 a half longitudinal section and a half side elevation; and Fig. 6 a half transverse section and a half end elevation.

The upper and lower frame-bars and an equalizer are shown in Fig. 3.

The swing-beam is of cast-steel and suspended by two wrought-iron suspension links which hang from the bolster on two steel pins; all of which are shown in Fig. 9 together with the wrought-iron axle.

The pedestals are of cast-iron, of form and dimensions shown in Figs. 12 and 13 of the tender truck illustrations on opposite page. Each pedestal is fastened to upper frame-bars by two $\frac{1}{4}$ -in. bolts, and by $\frac{1}{2}$ -in. bolt to lower frame-bars, which have lips forged on to aid in securing them. The pedestals are cast with the faces and sides which wear on the boxes, chilled, and are only planned on the ends where they are bolted to frames. The pedestals for both engine and tender trucks are made from the same pattern and drilled by the same templet, placed the required widths apart when bolted on to the frames of either truck.

There are 4 springs, two on each side, made with 8 leaves of $3\frac{1}{2} \times \frac{1}{2}$ -in. cast steel, each couplet of springs having a bearing on top in a cast-iron saddle, Fig. 4, underneath the upper frame

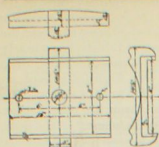


Fig. 14.

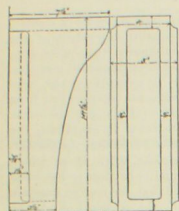


Fig. 15.—Pedestals.

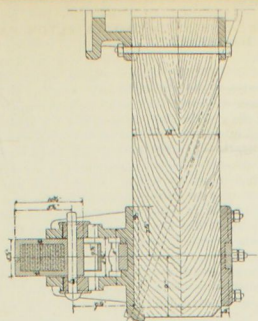


Fig. 13

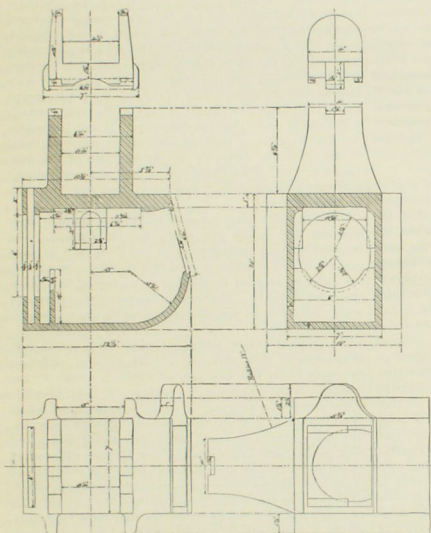


Fig. 16.—Journal-Box and Spring Pocket.

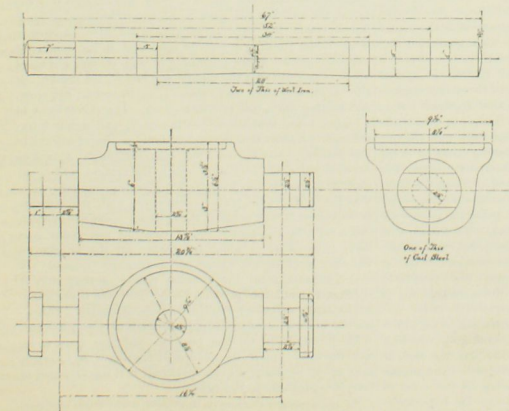
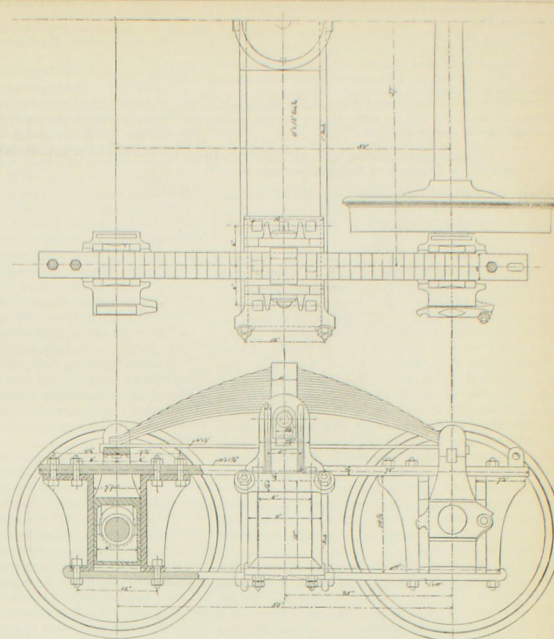


Fig. 9.—Axle, Center Bearing Suspension Link and Pin.



Figs. 11 and 12.—Plan, Section and Side Elevation.

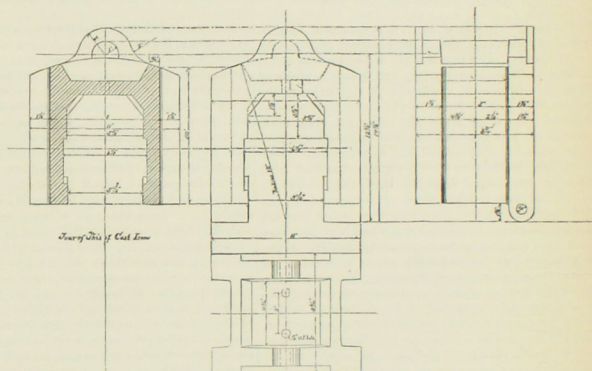


Fig. 10.—Journal Box.

bars, and on each end in a cast-iron shoe secured on the equalizing bars. The details of this shoe are shown in Fig. 5. One of the advantages claimed for this arrangement of springs above the equalizers is, that they are safer in cases of broken springs than they are when suspended below by hangers.

The cast-iron oil-cellar is shown in Fig. 7; the journal-bearing or brass in Fig. 8; and the cast iron journal box in Fig. 10. The parts of the boxes that come in contact with the pedestals are chilled, and neither boxes nor pedestals are planed, except the ends of the latter, as stated above.

The tender trucks, Figs. 14 to 11, are 4-wheeled, with cast-iron center bearings, and having extra cast-iron side bearings on the back truck, each truck being a duplicate of the other in everything. The spring-bands of the back truck forming the side bearings, being placed directly under bosses cast on the back-tender frame bracket.

The bolsters are of oak 11 x 13; and the frame-bars of wrought iron, all as shown in Figs. 11, 12 and 13.

Pedestals are the same as in engine truck; the front and side elevations are shown in Fig. 15, and a section will be found in Fig. 12.

The bolster truss-rod bearing is shown in Fig. 14.

The journal-box, Fig. 10, is of cast-iron with chilled wearing surfaces, and like the pedestals, is not planed.

The springs are 4x $\frac{3}{4}$ in. steel, with seventeen leaves and 59 in. long over all. The springs are secured by a 1 $\frac{1}{2}$ -in. pin passing through the lug on spring-band and the bearings or distance-pieces in the cast-iron saddle, which is secured to the bolster by six $\frac{3}{4}$ -in. bolts, two of which pass through the upper and lower frame-bars; the bolster is trussed on either side by two 1-in. rods, the ends of which pass through lugs cast on outer end of spring saddles. The ends of the spring bear upon the ends of a 4x $\frac{3}{4}$ -in. tie-bar, which binds the spring-pockets together; the

spring-pockets, which are shown in Fig. 10, rest on projections on the journal boxes, which extend upward on each side of the frame bars.

Distance pieces of different lengths are made for the spring saddles, and if any of the original set of a spring is taken out by use, a longer distance piece with the hole lower down is put in, and the center-plate of the truck again brought to the original height from the rail without resetting the spring.

These trucks are made to carry the tender or engine at the different heights required by the different size driving wheels, by using longer or shorter center-pins.

Kaolin for Locomotive Boiler Covering.

Kaolin is a species of very greasy clay found in large quantities in the vicinity of Aiken, S. C. It has been much used in making fire-brick, porcelain ware, and for adulterating candy.

Some two years ago, Mr. P. J. Cochrane, Master of Machinery of the South Carolina Railroad, observing the clay where it was exposed in an excavation, thought he would try it for boiler covering. After several experiments he succeeded in putting it on in a satisfactory manner, and he now has over thirty locomotive boilers covered with it.

It makes a solid covering that never shrinks or takes fire, and it holds the jackets to a smooth and regular surface. After it is put on, it never requires any attention to keep it in order. It has the additional advantage of permitting the removal of any part of it without disturbing the rest, and the pieces knocked off with a hammer can be softened with water to the proper consistency and again spread in the same place. It causes no corrosion, but its greasy character preserves the iron. It was applied to an old boiler whose outer surface was much rusted, and a few months afterwards when the cement was removed from around a check valve, the outer surface of the boiler shell was so clean that not a particle of rust could be gathered in rubbing the hand on it.

It prevents loss of heat from the boiler much better than the wood lagging, and every engine to which it has been applied does its usual work with much less fuel than before. An engine which came into the round-house at 9 P. M., having sixty pounds of steam, without any fire over night, still had twenty pounds pressure after 9 o'clock the next morning, when the engineer was obliged to blow it off so he could repair one of the steam cocks. The boilers seldom lose steam during the part of a day they lie over between runs.

Mr. Cochrane's method of applying this cement may be described as follows: A ring is set edgewise at the front end of the boiler. This ring is made in two sections of $1 \times 1\frac{1}{2}$ in. iron, and bolted together top and bottom. Strips of wood $1\frac{1}{2} \times 4$ in. are placed lengthwise of the boiler at the centers on the top and bottom, to which the jackets are to be fastened. The strips under the boiler have the inside corners cut out $\frac{1}{2}$ in. deep and $\frac{1}{2}$ in. wide to form recesses to hold the cement to the boiler while it is hardening. These strips are held in place by five or six $\frac{1}{2}$ in. bands of hoop iron around the boiler. Lead has been used instead of wood; but as these wooden strips are secluded from the air, it is thought they will last a long time before they are spoiled by charring. In the year and a half that they have been on some boilers none have given any trouble. When necessary, new ones can be readily put in by opening the jackets at these joints without disturbing the cement.

The mortar for the cement is prepared by mixing two parts of kaolin and one part of plaster of Paris in water, with jute fiber instead of hair, which is spoiled by the heat. The fiber is obtained by cutting up jute bagging in pieces about two inches square and picking it in pieces. As the cement sets very quickly after the plaster of Paris is added, it should be used soon after it is mixed. The kaolin is first broken up and softened in water, and the jute fiber mixed with it; then it is put in barrels and kept till used.

The cement is spread on the boiler in two coats $\frac{1}{2}$ in. thick with a trowel. The first coat is left with a very rough surface, and is thoroughly dried and then coated down before the second coat is applied. This coat is finished smooth, and to make a uniform thickness of cement on the boiler a straight-edge and a half-circle of the right size are used, resting upon the strips at the top and bottom of the boiler. Each coat is dried slowly by filling the boiler with water and heating it to boiling point. A greater heat is prevented by keeping the safety-valve open. If it is made hotter than the boiling point, steam forms between the cement and the boiler and forces it off. The slower it dries the better it is. It takes about half a day to dry each coat. When the cement is dry the boiler is ready for its jackets, which are painted on the inside with asphaltum or red lead and oil, and dried before they are put on, and they never corrode or rust out.

About three barrels of kaolin and one and a half barrels of plaster of Paris are used on an ordinary-sized boiler. The kaolin is taken from the banks of a cut on the line of the road, and costs nothing but the labor. It is applied with less expense for labor than wood. As it is believed that it will last as long as the boiler, it will be many times cheaper than wood, at any probable cost, to railroads in all parts of the country.

As soon as the prevailing esthetic craze has done its work on the sunflower, it will go for the pumpkin blossom, whose bold yellow, aided by the wayward vine, will make things lively in decorative and fashionable circles.

Communications.

The Economical Management of Locomotives

To the Editor of the National Car-BUILDER:

The principal points requiring the attention of the engineer to secure an economical performance of his engine, assuming that the firing is properly done, are a high water line, high steam pressure and a short point of cut-off. By a high water line is meant as high as the engine will carry her water without working it through the cylinders—a steam pressure of 130 or 140 lbs.—provided the boiler is safe at these pressures and the links hooked up to as short a point of cut-off as will allow the train to make its time, and regulating the speed as far as possible by shifting the reversing lever for longer or shorter points of cut-off, as the grades, etc., require, the throttle being wide open, providing that in this case the speed is not too great with the reverse lever in shortest cut-off notch. The throttle should be altered only when the desired change in speed cannot be attained with the reverse lever.

A high water line is economical, because a boiler full of water contains more heat, and will not therefore feel the effects of the incoming feed water to so great an extent. The steam pressure will not drop so quick, because there is a greater quantity of water which must change its temperature before the change of pressure can occur, and it is evident that the larger the quantity the slower will be the change.

A high steam pressure is economical because the amount of heat and water does not increase in same ratio as the pressure. That is, steam at a pressure of 100 lbs. does not contain twice the heat and water that steam at a pressure of 50 lbs. contains. The higher pressure is therefore more economical because, although the effective force has been doubled, the quantity of water and heat expended to accomplish this is not twice as great. Theoretically, and in general terms, the higher pressure at which steam enters a cylinder, and the lower it is exhausted, the greater is the resulting economy. But this, like many other theoretical results, is modified in practice, as there is a point of cut-off (dependent on the pressure of the steam) beyond which it is not economy to go. As this point with the ordinary boiler pressures is much shorter than it is possible to attain with the link, it is not deemed necessary to discuss it here.

It is generally known that the automatic cut-off stationary engines, Buckeye, Corliss, etc., are much more economical in the use of fuel and consumption of steam than the ordinary throttling engines. The difference between the two types is, that in an automatic cut-off engine the speed is regulated against varying changes in the load, through the agency of the governor, which automatically adjusts the point of cut-off, shortening it when the load is lightened and lengthening it when the load is increased, thus keeping the speed of the engine constant. In the throttling engine the point of cut-off is not changed, but remains constant, and the regulation is effected by the governor increasing and diminishing an opening in the steam-pipe, *valve-drawing* or reducing the pressure of the steam by cramping the opening through which it flows, and thus allowing a less quantity to pass through, but as the point of cut-off in a throttling engine is that which is due to the lap of the valve alone, and occurs at from $\frac{1}{2}$ to $\frac{3}{4}$ of the stroke—dependent on the lap—it follows that the steam exhausted from a throttling engine's cylinder leaves it at nearly as high a pressure as it enters it, and is thus thrown out into the air while it is yet capable of producing work by the expansion of it, if it were worked through an engine adapted to the purpose. To make this point clearer, suppose a locomotive to be jacked up clear of the rails, and one of the drivers utilized as a belt wheel from which power is transmitted to a line of shafting. There would be two modes of regulating the speed of the engine against varying resistances of the load or machinery driven. We might throw the reverse lever clear ahead, letting it remain permanently there, and attach a governor to the throttle lever, thus governing the engine by the opening or closing of the throttle. It is evident that steam in this case would follow the piston nearly full stroke, and we would have a throttling engine. We would find, if a test were made, that for each horsepower developed by the engine, that from 7 to 10 pounds of coal were burned. If the governor were now disconnected from the throttle-lever, assuming that it were powerful enough, and coupled to the reverse lever, the speed of the engine would be regulated through the governor by its pulling up or dropping down the reverse lever, thus shortening or lengthening the point of cut-off to meet the varying character of the load. We would now have an automatic cut-off engine, and for each horsepower developed we would find that we were only burning from 3 to 5 pounds of coal. This will serve to demonstrate why it is economy to govern the speed of a train as far as possible by the reverse lever rather than the throttle.

The writer recalls the case of a new link engine on which a great deal of time was spent in scheming out the link and valve motion, as the engine was the first of a class of standard engines which were to be adopted. The engine was given to one of the oldest engineers on the road to run, being assured that he would from his experience make the best showing with her. He was unfortunately

one of those old timers, known by railroad men as "a down-in-the-corner man;" that is, he had in early life fired and run an engine with no cut-off, and had kept the practice up of running link engines at full stroke or nearly so, which was not known to the Master Mechanic. The new engine under his charge was frightfully hard on fuel and "wouldn't go anywhere" for want of steam. The nozzles were decreased until she threw fire like a blast furnace, and the time spent on the scheming of the links and valve motion was as good as thrown away. Luckily he fell sick and a younger man took her, under whose management a great improvement was noticed the first trip. On the next trip the nozzles were enlarged, and she proved to be the best engine on the road in all respects. The difference was found to consist in the fact that the young runner used the reverse lever while his predecessor handled the throttle.

The petticoat pipe is also frequently the cause of trouble. The province of this pipe is to equalize the effects of the exhaust on the fire. It is well-known that gases, etc., will invariably seek, when under the influence of some impelling force, the shortest route. If no petticoat pipe were used the individual flues, affording the shortest cut from the fire to the smoke arch, would do the bulk of the work, and this would be easily demonstrated by examining the flues after a run, when it would be found that the flues affording the short cut would be clean, while those which were longer routes would be found to be more or less filled with cinders, etc. If it is found that the bottom flues are filled with cinders, it shows that the petticoat pipe is too low, thus blocking up or closing to an extent the passage from the bottom flues to the petticoat pipe, the lower flues being receptacles for cinders, and the top ones doing the work, unless it occurs that the pipe is too high as well as too low, *i. e.*, too long. A petticoat pipe with a skirt about the middle of its length, and the whole arranged so that either end can be lengthened or shortened independently of the other, will admit of easier adjustment. If it appears that the middle flues are not doing their share of the work, then a larger opening in the skirt will be advisable. If the front end fills up unduly with cinders, and the exhaust fails to clean it, the petticoat pipe may have an extended flange or flare on the bottom which will assist in remedying the difficulty. It will frequently be found that a careful adjustment of the petticoat based on the evidence furnished by the condition of the flues after a run, will often times make a free steaming engine out of a "cooking stove," as a heavy and dull steaming engine is termed.

Constant and regular pumping will also do much to effect economy, the supply just equalizing the demand. The engineer who alternately pulls on and shuts off the pump can not expect to make a good fuel showing, nor to have his boiler in as good a condition or as free of leaks as it otherwise would be. The varying temperature of the boiler which results from the alternate pumping up is also productive of leaks.

The blowing out of an engine while she is hot is very destructive of flues and bad for its economy although on many roads this can not be avoided, owing to the demand for the services of the engines. If it were possible it would be better to bring the engine into the house full of water, and then blow out three gauges under pressure, letting the engine then stand until quite cooled down and with all portions exposed to the fire covered with water, which might then be allowed to run out. The blowing out of the three gauges under pressure would remove considerable mud, and the engine being allowed to stand till cool with water in her would prevent the remaining mud from baking on hard which it would do if all the water were blown out under pressure and the boiler left at the heat of the water.

The detection and location of "blows" in the cylinder or valve is not always an easy matter, and many engineers do a great deal of guessing in reference to it. The writer has heard an old engineer report a blow, stating that if it was not in the valve or the packing of the right hand side, it was in either the valve or packing of the left. A blow in the cylinder packing is heavier than that in the valve. It generally occurs at the beginning of each stroke, and ceases off or ceases towards the middle and end of the stroke. If the engine is hooked up to about 12 or 16 inches, run slow, and pulling hard, this will be noticed. The valves blow in a higher tone, sometimes continuously, and again intermittent. A blow that occurs suddenly is almost always in the packing—broken packing ring—although a broken valve or an opened up sand hole in the bridges will occur quite as suddenly. Blocking the wheels and placing the valve over the center of the ports so as to cover both will indicate its tightness at this point if the cylinder cocks are opened, but a valve is frequently found tight at one point and leaky at another. Placing the engine on the quarter on one side, blocking the wheels and noting the quantity of steam escaping from the exhaust nozzle on that side, is frequently tried, the packing being indicated if the quantity is great, and the valve if it is more moderate. Throwing the reverse lever to the opposite end of the quadrant, with the engine in the last position, will also assist to locate the blow, and if the blow still continues as heavy it may safely be charged to the packing; if it has changed in tone it is probably in the valve.

Some passenger engineers, in getting away from stations, drop their engine down to full stroke, and pull the throttle

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as wide open as the engine will stand it without slipping others stretch out this a little and sand the track to get away from a station quicker. On some trains, where the stops are frequent and the running time fast, this course may be necessary, notwithstanding it is not productive of economy, as the fire is torn up and dragged in unburnt chunks through the flues. On trains where the stops are not as frequent engineers will still follow the same course, although there is no necessity for it, because after the engine has made twenty revolutions at full stroke, a saving in fuel will result if the reverse lever is notched back and the train brought to its running speed in this manner. The greater time required to reach this speed can be made up by running a little faster between stations, and thus the fire will not suffer from the heavy full stroke exhaust, and the engine will use steam expansively from the start almost. It is the engineer who watches the apparently unimportant points, saving here and saving there, who sees that his oil cups are feeding only enough to keep the bearings cool, who watches for loose split-keys and nuts, and secures them before they drop off, who makes the wonderful records of economy so much admired by his less attentive brother engineers.

SUTHERLAND.

Repairing Broken Locomotive Cylinders.

To the Editor of the National Car-Builder:

I give you herewith detailed method of repairing cylinders belonging to engines Nos. 9, 7, and 23, of the International & Great Northern road. No. 9 was thrown on the track by a misplaced switch, putting a rail through one cylinder and a tie through the other. I replaced all pieces, securing some with sheet iron patch, bolted through, shrunk rings on broken flanges, put back heads on, and with a boring-bar bored out the cylinders to 16½ inches diameter close up to the heads, leaving a shoulder ⅝ inch high. In the mean time, I prepared a cast-iron bushing, boring it out and turning off in the lathe to a driving fit, or as one would fit a crank pin so as to have it true. The cylinder was then heated, taking care that the expansion was as near equal as possible, and when large enough (measuring by temple) the bushing was pushed to place and secured with a clamp until cold. I then bored the cylinder, or rather bushing, out to 16 inches standard size, using fore and aft bolts with T heads that clamp the back heads securely and permanently to place, thereby relieving body of cylinder from any strain, as the heads support one another. The joint is then faced to the surface, so bushing and cylinder faces are level. In this way a cylinder in seven pieces was made as good as new at a cost of \$40, following pattern. This engine has 16 x 24 cylinders, 4½-foot drivers, and pulls 16 and 17 cars over a road of 66 feet maximum grade.

Engine No. 7 ran off track, breaking both cylinders, overshoots out by pushing them upward, leaving only 16 inches of bore in upper part. Repaired them same as No. 9, only making bushing ⅝-inch thick, and boring old cylinders to 16½ diameter. This is also one of our best engines, and has been running nine months in same service.

Engine No. 23 is a switch engine; broke piston head, pieces of which knocked out overshoot, or bottom part of steam way, in both ends of left cylinder. Put ⅝-in. bushing on her. Has been doing very heavy work for five months, and is doing good work now. In this way (each casting taking its proportion of cost of pattern) the cost of bushing a cylinder has been reduced to the moderate sum of \$30. I cast them 1½ inches longer than is required, clasp them in blocks and bore out, leaving them ⅝ small; then bolt securely to lathe face blocks that will turn up to diameter of bore, and 4 inches thick. Take a rough follower and turn to fit diameter of bush with a shelf that will lap up and over the edge. Drill a small hole in it while in lathe, for back center to work in, being sure it is centered. Drill four ⅝ holes in the worst end of bush, have four L-shaped bolts ½ in. diameter, push the bushing on to the blocks on face plate with back center, letting it revolve until well up against the lathe head; the edges of the bushing being faced, it will find a true bearing; then with the aid of the four ½-in. bolts secure it fast to the head and turn off the bushing to a good driving fit; afterwards cut off the surfaces 1½ inches at lathe head, which will cut off the holes in which the bolts are inserted that keep the bushing from turning while being reduced to proper size, and it is ready for drilling for ports. The back end should be cut clean out, as it only covers it, but front end should be drilled with 1¼ in. drill, three of them clean out, then a space of ½ in. inch, then three more and another ½-in. space, then three more holes long enough to expose full opening for steam, while the two bridges being left, keep the edge out to level securely, as the cylinder head may push it back and cause joint to leak.

R. H. JOHNSON, M. E.,
International & Great Northern R. R.

Keying Locomotive Main and Side Rods.

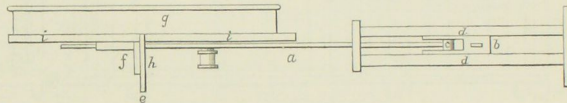
To the Editor of the National Car-Builder:

The keying up of the rods of an engine requires considerable attention on the part of the engineer, if he expects them to render the maximum of service.

When an engine comes out of the shop the main rod should be of such length as to give equal clearance be-

tween the piston and cylinder heads when the engine is on either center. This is accomplished by getting the "striking-points;" that is, by pinching the cross-head ahead (if the front cylinder-head is on the cylinder) until the piston strikes the cylinder-head, and marking the guides flush and even with the forward end of the wing of the cross-head. Then pinching the cross-head to the back end until the piston comes in contact with the back cylinder-head, and making a second mark on the guides even with the back end of the wing of the cross-head, and pinching the cross-head ahead until the ends of the cross-head wing stand equidistant from each of the marks made on the guide. The cross-head and piston are then in the center of the guides and cylinder. If the front head is not in place, take the thickness of that portion of the cylinder-head which projects into the cylinder, lay a straight-edge across the front face of the cylinder, and apply a rule projecting into the cylinder a distance equal to the thickness of cylinder-head projection obtained, as above. The piston may then be pushed forward until it just touches the end of the rule. If the piston is not in the cylinder, and nothing but the cross-head is in place, a stick may be provided; and, beginning at one end of the same, lay off on it the thickness of the piston head entire, including the follower bolts if they project outside of the follower. Then lay off from this the length of the piston rod between the piston-head and cross-head, and cut the stick off squarely at this point, which now represents the length of the piston-rod and piston-head; and it may be placed through the piston-rod hole in the back cylinder-head, its end abutting against the cross-head and the striking-points found by means of it.

Having placed the cross-head centrally between the striking-points, as previously explained, the length of the main rod is next in order. To obtain this, place a straight-edge *i*, as shown in diagram, top view, against and across the edge of the tire *g*, as shown. Place a straight edge *e*, with its front edge *h* even with the center of the axle; adjust a square *f* to the edge of the two straight-edges *e* and *i*, as shown. Then, with a wooden rod *d*, one end placed against the cross-head wrist *e*, and the other end passing under the straight edge *e*, make a mark on this rod even with the face *h* of the straight-edge *e*. To this add half the diameter of the cross-head wrist, and the resulting length is the correct length of main rod from center to center of brasses, and a length that will give equal clearances at each end of the cylinder; *a* are the guides and *b* the cross-head. If the main rod is fitted with new brasses, they should be fitted to the straps, which should be placed on the rod with the bolts and keys in position



and the length of the rod laid off from the rod *d*, the straps removed and the brasses bored out. If the old brasses are to be used they should be fitted to the pin and cross-head wrist, and the straps placed on the rod and shifted in the straps by liners and the keys, until the length from center to center corresponds with the length as found on the rod *d*, when the rod may be put up, being careful to get the same liners in as when getting the length of the rod, which latter should be accomplished with the rod on the floor. If the same liners are used in putting the rod up, and the keys driven until the brasses meet, no doubt will exist as to the correct length of the rod. In fitting the brasses to the pins, the latter should first be corrected with a file, if out of round, and fitted to be brass-and-brass when keyed up in the strap, and still allow of being revolved freely by hand on the pin, the straps being off the rod.

In adjusting the side-rods, the wheel centers should be taken in a pair of trams after setting up the wedges. If they do not correspond or closely approximate they should be equalized by shimming back the shoe on the longest side. The pin centers should also be trammed with the same tram, and the back wheels slipped slightly on the rail if it is necessary to bring the pins to the trams on each side. After an engine has run for some time, it will be found that the pins are "late," or out of position by whatever lost motion there is in the side rods; hence the necessity for slipping them to meet the tram. The brasses having been fitted to the pins, the front strap with the brasses in it may be put up with liners enough to bring the joint line of the brasses central with the oil hole. The rod may then be put up and the back brasses shifted in their strap with the double keys until the rod can be slightly shaken at both ends sideways. As the brasses had been fitted to the pin so as to move easily when brass-and-brass in the strap, the keys can be driven so as to cause the brasses to bind on the pins. The front end of the rod being up and the pins the proper distance apart, it evidently alone remains to shift the back brasses in their strap—the rod being in place until each end of it can be slightly shaken sideways. It will be found that rods put up with the brasses, brass-and-brass, if rightly fitted previously, will run much longer with entire absence of heating or straining of the pins than if they are left "open." The

pins can be tested by disconnecting one end of the rod, keying up the other rather tightly and trying the disconnected end of the rod by seeing if it leads correctly to its pin or wrist, the engine being pinched so the pin may be tried on the centers, quarters and eighths. The writer intends in a future article to treat more fully the subject of bent pins, etc.

In keying up Mogul engines, if a thorough job is to be made of it, the rods should be taken down and connected together on the floor, the wheel-centers trammed, and their distances used to adjust the brasses in their straps, being careful to use the same liners in putting up the rods, and driving the double keys to the marks which should be made on them, even with the straps when the brasses are shifted to agree with the tram. If the brasses are already filed apart, and a slight amount of lost motion only is to be taken up, all the keys back of the front one should be loosened up, and the front pair of brasses adjusted first, the second pair next, and so on to the back end. Seldom, at best, however, can a first-class job be made of it in this way, and it will be found best to always have the brasses brass-and-brass; and where there is lost motion in the rods take them down, refit the brasses to the pins, bring the brasses to correspond with the tram set to the wheel centers (doing this with the rods coupled together on the floor) and then put the rods up, allowing the brasses to remain as they are until sufficient lost motion is again developed to make it necessary to repeat the process. In keying the rods on any engine the wedges should be up in place.

V-HOOK.

The Pennsylvania Railroad Company's Report.

The increase of freight tonnage during the year on the main line and branches between Philadelphia and Pittsburgh, and on the New Jersey Divisions, was 4,428,692 tons, and 415,593 tons on the Philadelphia & Erie road; and the increase in the number of passengers carried on all these lines was 2,410,367. The cost of operating main line and branches was 54.7 per cent. of receipts of transportation; of the main line and branches of New Jersey Division, 68.73 per cent.; and of the Philadelphia & Erie, 70.35 per cent. The average freight earnings per ton per mile on all lines east of Pittsburgh was .857 ct.; the average cost of transportation, .517 ct.; and average profit per ton per mile .340 ct.; the average decrease in net profit being ⅓ of a mill per ton per mile. The average earnings per passenger was 2.376 cts. per mile; the cost of transportation 1.615 cts.; and average net profit per passenger per mile, .761 ct.

There were handled on the three divisions east of Pittsburgh and Erie, 1,564,558 pieces of baggage, being an increase of 280,896 over the number handled in 1880; and the entire amount paid for lost and damaged baggage was \$487.15.

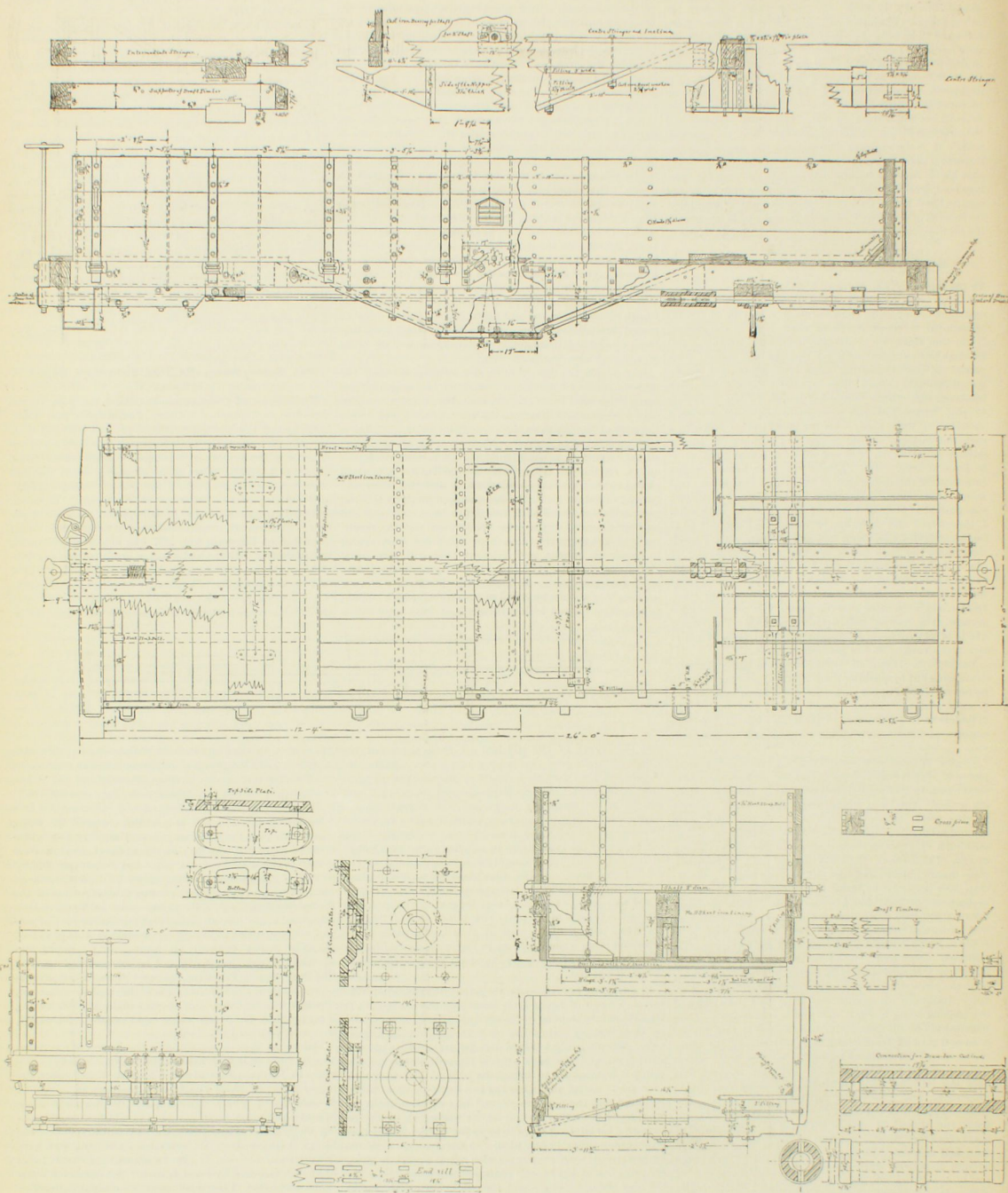
The gross earnings on all lines east of Pittsburgh and Erie were \$44,124,182, and the net earnings \$14,632,101, being an increase over the previous year of \$745,638. The net income of main line was \$10,131,718, and net loss on New Jersey Division \$302,864, leaving a net balance of \$9,828,853. The operating and other expenses, however, show an increase which has absorbed a considerable portion of the increased earnings, a result which could hardly have been otherwise in the face of diminished freight rates. The previous disproportion in the gross earnings and expenses of the New Jersey Division has been greatly lessened, and justifies the hope that it will soon be obliterated altogether. The lines west of Pittsburgh operated by the Pennsylvania Company show a net profit of \$2,860,752, and the Pittsburgh, Cincinnati & St. Louis Co.'s lines a loss of \$88,838, leaving a net profit of \$2,772,413, which is a decrease of \$385,627, as compared with 1880.

There have been placed through the system of car trusts on the lines east and west of Pittsburgh, including subleases to Northern Central and Allegheny Valley roads, the total number of 20,784 freight cars, representing a cost of \$11,337,000, of which amount \$5,270,000 has been liquidated by payments, leaving balance of certificates outstanding \$6,067,000. There were built at Altoona during the year, 103 locomotives, 93 passenger train cars, and 4,174 freight cars; and on all the lines east of Pittsburgh and Erie, 17,898 tons of steel and 1,137,290 ties have been used. The conclusion of the report contains a significant reference to the diminishing freight rates in connection with the cost of moving freights, and says, "that these rates have now reached a point where only through remarkable economy in the movement of tonnage, and the maintenance of the properties at the highest standard of efficiency, can any profit be realized therefrom."

A New York and Boston fast passenger train is to begin running about the first of June. It will consist of one baggage and four drawing-room cars. The engines will have 18 x 24 cylinders and 7 foot drivers, and the distance between the two cities will be made in five hours.

STANDARD COAL CAR-RICHMOND & ALLEGHANY RAILROAD.

Designed by George D. Harris, Master Mechanic. Built by the Tredegar Co., Richmond, Va.



GENERAL DIMENSIONS.

Length of body inside.....	23 ft. 6 1/2 in.
Length of frame out to out.....	26 "
Width of body inside.....	7 " 7 "
Width of frame out to out.....	8 "
Width out to out.....	8 " 11 1/4 "
Bottom of hopper to top of sills.....	2 " 3/4 "
Bottom of hopper to top of sides.....	5 " 1 1/4 "
Capacity of car.....	40,000 lbs.

SIZE OF TIMBERS.

Side sills.....clear heart yellow pine 4 1/2 x 9 in.

SIZE OF TIMBERS.

Intermediate sills.....	clear heart yellow pine 3 1/4 ft. x 8 in.
Middle sills.....	" " 4 1/2 x 9 "
End sills.....	" " 7 x 9 "
Middle sill.....	" " 8 x 9 "
Bolsters.....	clear heart white oak 7 x 14 "
Buffer blocks.....	" " 4 x 9 "
Draft timbers.....	" " 6 1/2 x 8 1/4 "
Side stakes.....	clear heart white oak 3 ft. 9 1/2 in. x 3 1/4 x 3 1/4 "
Cross pieces.....	clear heart yellow pine 4 1/2 x 9 "

CONSTRUCTION.

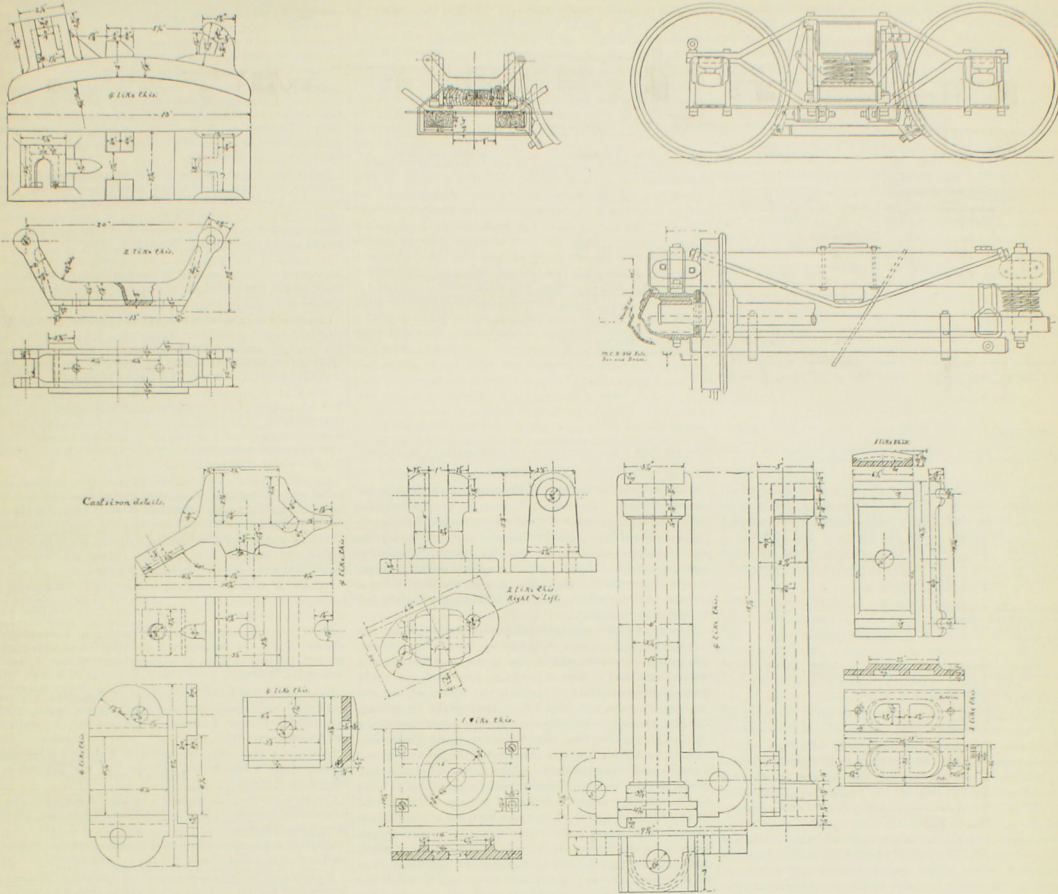
Sills to be framed with double tenons; all bolts to have check nuts. Draft timbers to be secured to middle and end sills by 3/4-in. bolts; buffer blocks to end sills by one 3/4-in. bolt and one 1/2-in. rod, and two 3/4-in. bolts through blocks, draft timbers and carry iron bars; a strap of iron 3/4 x 4 in. secured to lower side of each block; carry iron bar 1 x 3 x 27 in. on brake end of car, and on opposite end to be 1 x 3 x 17 in. Draw-head of cast-iron; follower plate 1 in. thick, 6 x 8 in.; spring 6 x 3 1/2 in. Center plate secured to bolster by four 3/4-in. bolts, top of plate recessed for head of king bolt, which is of 1 1/2 in. round

iron, 12 in. posts to have Trussing on Each side of in. Top of Car and end planks 12 in. beyond on to top in outside sills; sides lined with No. 8 in. wide, warped by 1/4 in. diameter, draw-head 12 in. dark mi

A CORNER sen. life sup has been ext feet wide, w 54,000 pound car bottom brackets of w prevents the unloads that with th inch, and w cases can no freight, with five ordinary

A SCHOOL temple of lea the touching purple expert workman, I self with ad opened the se

FREIGHT CAR TRUCK-RICHMOND AND ALLEGHANY RAILROAD.



iron, 12 in. long, with solid round head 3 in. diameter. Side posts to have cast-iron pockets secured to side sills by U-bolts. Trussing consists of two 1-in. rods enlarged to 1½ in. at ends. Each side of car to be composed of three oak planks 2¼ × 12½ in. Top of sides protected by straps secured to sides by 18 bolts. Car end consists of three oak planks 2½ in. thick; two bottom planks 12 in. wide, top plank 11 in. wide; side planks project 4 in. beyond end planks, and have oak post 3 in. square from floor to top in outside corners. Bottom of hopper 15½ in. below side sills; sides of hopper 3¼ in. oak plank, bottom 2 in. ditto, and lined with No. 11 sheet iron. Opening in bottom of hopper 2 ft. 8 in. wide, with two doors of 1½ in. oak plank. Doors operated by ¾ in. chain attached to 2-in. shaft running across car and worked by ratchet wheel. Flooring of car 1½ in. oak plank, tongued and grooved. Brake staff 1½ in., and brake wheel 14 in. diameter. Safety hook at each corner of car. Center of draw-head 34 in. above top of rail. Car painted with three coats dark mineral paint; all castings to be R. & A. R. R. pattern.

A COMBINATION freight car, the invention of T. W. Wilson, late superintendent of the Port Hope (Ont.) car shops, has been exhibited at Chicago. It is 34 feet long, and 8½ feet wide, weighs 27,000 pounds, and can carry a load of 54,000 pounds. The axles are steel. Below the ordinary car bottom is a lower compartment, which carries 300 bushels of wheat, which lowers the center of gravity and prevents oscillation. The loading is done by spouts, and the unloading by a false bottom. The economy claimed is, that with the same pressure of steam, 140 pounds to the inch, and with the same amount of fuel, twenty of these cars can move in one train load 165 tons more of paying freight, with 35,000 pounds less tare than a train of twenty-five ordinary cars.

A SCHOOLMASTER at Austin, Tex., upon entering his temple of learning a few days ago, read on the blackboard the touching legend: "Our teacher is a donkey." The pupils expected there would be a combined cyclone and earthquake, but the philosophic pedagogue contented himself with adding the word "driver" to the legend, and opened the school with prayer as usual.

This truck is designed for freight cars of 40,000 lbs. maximum capacity.

Wheel base 5 feet; wheels 33 inch, double plate; axles M. C. B. standard; Hewitt box lds.

Top and bottom arch bars 1½ × 3 in.; bottom tie-bar ¾ × 3 in. Bolsters heart white oak; top bolster 7¼ × 13 in., bottom bolsters 3¼ × 13 in. Center plate fastened to bolster with four ¾ in. bolts; top bolster strengthened by two 1-in. truss rods, enlarged to 1½ at ends. Plate at each end of the top bolster 2¼ × 1 × 17 in. long. There are two 1-in. bolts on each side of frame, extending through arch bars and bottom tie-bar, with four ¾ bolts through arch bars, oil boxes and tie-bars. Two eye-bolts on outside corners for ¾ in. check chains connected by hooks to side sills. One truck of each car to have brake attached, as shown.

Two noticeable features of this truck are the safety straps for brake beams, and the method of placing the side bearings with truss rod plate resting against them.

FRANK A. WHITE, of Cortland, has received a patent for an automatic fire extinguisher for railroad cars. This invention consists of tanks containing chemicals in solution provided with valves and connected with portions of the car, in such a manner that liquid will be automatically liberated in case of collision. It is a peculiar and ingenious contrivance, and the inventor has perfect faith in its capabilities. —*Utica (N. Y.) Herald.*

THE varnishes and coach colors of the Mound City Paint & Color Co., of St. Louis, Mo., are becoming favorably known among car painters at the West.

THERE is a story told of a fine old Cornish squire who only drank brandy on two occasions—when he had goose for dinner and when he had not.

THERE is an awful state of affairs in a little Michigan town where a type-setter substituted the word "widows" for "windows." The editor wrote: "The windows of the church need washing badly. They are too dirty for any use, and are a disgrace to our village."

The first passenger car built at the shops of the Norfolk & Western road has just been completed. It is an officers' car, designed by Mr. Henry Fink, the General Manager, and is 46 ft. 3 in. long over sills, and 10 ft. 2 in. wide over all. At one end is a sitting room 12 ft. 9 in. in length, from which there is a passage way flanked by a state room 12 ft. 4 in., leading to a sleeping room of same size, and containing six berths and a lavatory. Next are the heater and closets, and at the other end of the car a small smoking room. The marble for the lavatories in sleeping and state rooms is two inches thick, and recessed on top ¼ in. deep. The berths are Leighton's patent. The bedding is stowed under the seats so as to relieve the top of the car from weight and incumbrance during the day. The seats are upholstered in cherry plush. The inside finish, except a few light mahogany moldings, is of ash. The window sashes, sill caps and strips are mahogany. The windows are 27 × 40, curtains are used instead of blinds, and the panels are narrow, consisting of a plain strip of ash. The side head-lining is also of ash, and of oak in the clear-story, with mahogany moldings. The sheathing between window sill caps and truss-plank is 3-inch beaded strips of ash placed diagonally. With the exception of a small mahogany rosette over the windows and some slight grooving in the sub-facia board, panels and rail over the windows, there is no ornamentation. All the metal work is nickel plated. The doors have a mahogany frame, the upper panel is of ground glass and the lower one of ash. The clear-story windows are swing ventilators. The outside of the car is painted red brown, with a little gilt ornamentation. The trucks are 4-wheel, with double bolsters, which make the riding almost as easy as with six-wheel trucks; wheel base, 7 feet; Baker heaters, Miller platforms, Westinghouse brakes, etc. Total cost of car \$6,000.

It certainly would seem that the steadily increasing weight of cars and locomotives would deter people from getting between them and the rails; but with a temerity that is simply amazing, they continue to do that very thing.

Abstract of the Lake Shore & Michigan Southern Railway Report of Mileage made by Cast Iron Wheels removed from Engine, Tender and Passenger Equipment, during the Year 1881.

Wheels removed, including worn out and defective.	Total mileage of all wheels removed.	Greatest mileage of worn out wheels.	Least mileage of worn out wheels.	Average mileage of worn out wheels.	Average mileage of all wheels.	New wheels put under.
2,506 (33 inch) 1,163 (30 inch) 308 (28 inch) 11 (30 inch)	140,440,016 62,082,291 19,011,451 722,679	220,513 217,792 173,308 121,502	12,398 11,012 77,692 39,463	71,958 62,364 59,014 83,614	59,635 54,112 51,902 65,689	4,477 1,201 443 23
Miles run by Engine, Tender and Passenger Equipment Wheels removed during five years.						
Wheels removed.	Total mileage.	Average mileage.			Wheels put under.	
9,806 (33 inch) 6,721 (30 inch) 1,750 (28 inch) 47 (30 inch)	574,384,613 300,817,010 83,571,000 2,477,295	58,575 44,758 47,502 52,708			17,413 9,739 7,265 55	
Recapitulation of 33-inch Wheels worn out in five years.						
Number of wheels.	Total mileage.	Average mileage.			Wheels put under.	
6,974	471,396,985	67,593			17,413	
33-inch Wheels reported flat by sliding, during five years. Not included in foregoing because not the fault of iron or manufacture.						
Number of wheels.	Total mileage.	Average mileage.				
386	9,327,724	23,555				

Note.—This report represents the minimum mileage, as no allowance has been made for switching, except in case of shifting engines, which are estimated at six miles per hour when in steam.

The above is condensed from the annual report of wheel performance prepared by Mr. A. C. Armstrong, the Purchasing Agent of the road. The wheels referred to in the report are of five different makes, the names of the makers not being given. The form of these reports being the same every year, we are able to give the following comparative results for the past three years:

Worn-out wheels removed	1879.	1880.	1881.
Broken tread and seams	2,243	2,751	2,896
Flat bad chill or crumbling tread	330	173	155
Sharp flange	6	673	840
Broken plate	190	201	126
	6	2	31

Total No. wheels removed	3,391	3,800	4,048
New wheels put under	4,088	4,700	5,144

Average mileage of 33-inch wheels:

From 1877 to 1881 inclusive	67,593
From 1876 to 1880 inclusive	63,134
From 1875 to 1879 inclusive	59,130

From this it appears that there were 248 more wheels removed from all causes in 1881 than in 1880, and 657 more than in 1879. It also appears that the average mileage increased from 59,130 during the five years ending with 1879, to 67,593 during the five years ending with 1881—a gain of 8,463 miles. This indicates that the quality of cast-iron wheels is improving so far as the service of this particular road is concerned. The record of the road shows the mileage of each wheel in the engine, tender and passenger equipment, the date when put under and when removed, and the cause of removal. No wheels are transferred from passenger to freight service. The object of this record, and the wearing out of wheels in passenger service, is to ascertain, on the basis of actual mileage, the merits of the wheels made by different manufacturers, and also whether each wheel makes its guaranteed mileage. A 33-inch wheel is considered "worn out" when it has run 50,000 miles, or when the chill is worn through in more than two places, although it may have run very much less than that distance. There are, of course, many exceptional wheels that make a much greater mileage than this before they are actually unfit for service, while many fail to make their guaranteed mileage, and many of these are removed for defects that are not the fault of the metal or the making, but are the results of ill-usage in one way or another.

We should be glad to receive similar statements of wheel service from other roads. For purposes of comparison, every thing depends of course upon the accuracy of the record, and we know of no better way of testing the actual capacity of wheels than to ascertain the exact mileage life of each wheel in passenger service, as is done on the above-named road. It would also be interesting to know the names of the respective makers, but perhaps it is well enough to withhold them, except in cases where the record of performance is remarkably good.

The New Baker Car Heater.

The Baker Car Heating Company, of New York, has devised a new method of heating passenger cars by using steam for that purpose instead of hot water. Underneath each car is suspended a small boiler or generator inclosed in a fire-proof casing, from which the steam is supplied to pipe radiators that run along the truss-planks inside the car, and which may be doubled up at the corners of the car, or wherever extra heat is wanted. The diameter of the boiler is about 30 inches, and the space between it and the bottom of the car about 9 inches. There is also the same space between the ash-pan of the heater and the track. The fire is made and attended to entirely from the outside, and is replenished by means of two coal chutes,

one on each side of the car, and holding coal enough to last one or two days. The fire draft may be operated within the car so as to regulate the degree of heat. The smoke pipe is inclosed in non-conducting material, and passes into the car and up to the roof at the end corner. The water is supplied to the boiler in such a way that only the proper quantity can run in. In ordinary cold weather a steam pressure of 10 pounds is sufficient, and proportionately less in moderate weather.

The object of the arrangement is to lessen the danger of cars taking fire in case of collision, by having the fire outside instead of inside, and where it can readily be got at and extinguished; while at the same time each car can be warmed independently of the others. These advantages are very obvious, and also others that might be named. The plan also seems practicable. The passenger cars of the Philadelphia & Reading road have for many years been warmed by hot air furnaces underneath the car bodies, and we have never heard that the plan was attended with any special inconvenience. The new Baker method differs from it only in the use of steam instead of hot air. In the circular in which the merits of this new plan are set forth, it is claimed that steam is far better than hot water for car heating, for the reason that it can be more readily applied, that it cools off quicker, and what is more important than all, it is safer. From this it would seem that the Baker hot water heaters, now so extensively used, have reached the limit of their usefulness and must give place to better and safer methods.

Sweet Gum Timber.

The diminishing supply of black walnut for cabinet work and car-building purposes makes it highly desirable that its place should be made good by other kinds of hard wood not hitherto used. Many inquiries are made as to the capabilities of sweet gum for this purpose, a kind of timber which is quite abundant in some of the Southern States. It is strong, close grained, has a handsome color, is easily worked and holds a nail well, but has an inveterate tendency to spring and warp, so much so, in fact, that if used for coffins, it would, to borrow the expression of a dealer, "twist itself right out of the ground, corpse and all." It is said to give good satisfaction, however, where it has been worked narrow and well fastened. Any one who can discover a method of preparatory treatment that will overcome this difficulty has a fortune within his grasp. There is an immense waiting market for the timber, in case it can be made available for the same general uses as black walnut. A writer in the *Northwestern Lumberman*, who has been in the lumber business for many years, says he has used it both for framing and finishing, and finds it does well in a twelve years' test, although it is only the old, well matured trees that turn out good finishing lumber. These trees can be distinguished by their scaly bark. The older the tree the less is the liability to warp, and the better the color; but lumber cut from young, smooth barked trees will warp and spring badly.

It is always safest to establish the fact first and the theory last, rather than the theory first and the fact last.

NTROCKS, the spouse of Nebuchadnezzar, is said to have been an inventor and something of an engineer in her day, having designed an artificial lake which served the purpose of a fortification, and a dam against the Euphrates during the freshets; and she probably had something to do with the famous hanging-gardens of Babylon. There were no cattle cars nor car couplers in those days to tax her inventive ingenuity, or there is no telling what would have happened.

Recent Reports of Railway Rolling Stock.

Chicago & Alton.—213 engines; 105 passenger train cars; 3,223 box, 1,948 stock, 1,350 flat and coal, 10 dump-coal and 97 caboose and drivers' cars; 15 tool and boarding cars—total, 5,948 cars. There are 19 Pullman sleeping cars on its lines. During the year 6 engines, 300 box, 200 stock and 160 flat and coal cars were added. Near the close of the year 16 old engines were sold, to be replaced by 16 heavier ones.

Hannibal & St. Joseph.—76 engines; 29 passenger, 4 reclining-chair and 14 baggage and mail cars; 674 box, 9 refrigerator, 444 combination, 102 stock, 74 flat, 404 coal and 39 caboose cars; 1 directors' car, 1 pay car, 1 derrick, pile-driver and 2 wrecking cars; 58 hand-cars, 61 rubble cars and 6 velocipede hand-cars—total, 1,234 cars.

Union Pacific.—438 engines; 116 first-class passenger, 29 second-class, 42 sleeping, 30 emigrant, 40 emigrant sleeping, 1 observation, 13 combination and 112 mail, baggage and express cars; 4,788 box, 1,079 stock, 1,484 coal, 10 charcoal, 1,373 flat, 12 hay and 202 way or caboose cars; 7 officers' cars, 4 pay-cars and 51 service cars—total, 9,363 cars.

St. Louis & San Francisco.—64 engines; 21 passenger, 2 sleeping, 8 combination and 16 baggage cars; 842 box, 285 stock, 20 flat, 903 coal and 43 caboose cars; 2 directors' cars, 1 pay-car and 9 service cars—total, 2,152 cars.

Cheapeake & Ohio.—123 engines; 27 passenger, 2 sleeping, 7 combination and 10 mail and express cars; 907 box, 129 stock, 197 flat, 1,929 coal and 70 caboose cars; 175 service cars—total, 3,543 cars. Additional during the year, 49 engines; 1 baggage car; 151 box, 21 stock, 90 flat and 438 coal cars.

New York, Pennsylvania & Ohio.—215 engines; 77 passenger, 20 combination, 3 postal and 40 baggage and express cars; 3,596 box, 502 stock, 3,070 flat and coal, 26 coal-dump and 104 caboose cars; 1 pay-car, 1 private car and 20 service cars. There were 45 engines changed from 6 feet to standard gauge during the year—total, 7,390 cars.

Norfolk & Western.—81 engines; 24 passenger, 2 sleeping, 4 postal and 12 baggage, mail and express cars; 556 box, 199 stock, 315 platform and gondola and 42 caboose cars; 1 pay-car and 65 ditching cars—total, 1,220 cars.

Worcester & Nashua.—20 engines, 19 passenger, 3 parlor and 7 mail and baggage cars; 293 box, 110 flat and 100 coal and gravel cars, and 3 snow-plows—total, 505 cars.

Raleigh & Gaston and Raleigh & Augusta.—22 engines; 15 passenger, 4 baggage, 871 box, 141 flat, 20 gravel and 2 officers' cars—total, 555 cars.

South Carolina.—19 engines; 19 passenger, 4 sleeping, 1 officers', 1 pay, 13 baggage and smoking, 6 mail and express, 502 box, 133 flat, 14 stock, 97 caboose, 1 derrick and 7 shanty cars—total, 728 cars.

Wilmington & Weldon.—34 engines; 11 first class, 6 second and 2 combination passenger cars; 5 express and baggage, 221 box, 135 flat, 10 stock, 7 caboose, 2 bridge, 1 pay, 2 postal and one wrecking car—total, 404 cars.

Seaboard & Roanoke.—21 engines; 5 first and 7 second-class passenger cars, 2 express and baggage, 117 flat and 250 box cars—total, 381 cars.

Carolina Central.—26 engines; 1 officers', 6 first-class and 5 second-class passenger, 5 mail and baggage, 243 box and 124 flat cars—total, 389 cars.

Virginia & Truckee.—17 engines; 10 passenger and 4 baggage, mail and express cars; 7 box, 237 flat and 117 ore cars.

Northeastern (S. C.).—14 engines; 11 passenger, 2 postal, 5 baggage, 98 box, 82 platform and 10 gravel cars—total, 308 cars. One new engine, 3 box and 37 platform cars were added during the past year.

Petersburg.—10 engines; 4 passenger, 2 express, 1 mail, 65 box, 50 platform, 4 stock, 2 caboose and 3 construction cars—total, 131 cars.

Central, of South Carolina.—2 engines; 8 passenger 30 flat and 25 box cars.

Hauling Capacity of Locomotives.

We take from the *Railroad Gazette* the following table showing the loads or weights of train which locomotives can haul on different grades and curves, at a speed of 20 miles an hour under ordinary conditions, in tons of 2,000 lbs., not including engine and tender. The calculations are made for the following types of engines:

Type A.—American locomotive with four driving-wheels and 12,000 lbs. weight on each wheel, the total weight of engine being 36 tons.

Type B.—Mogul or ten-wheeled locomotive, with six driving-wheels and 12,000 lbs. weight on each wheel, the total weight of engine being about 42 tons.

Type C.—Consolidation locomotive with eight driving-wheels and 12,000 lbs. weight on each wheel, the total weight of engine being about 54 tons.

	Type "A."	Type "B."	Type "C."
<i>On straight track:</i>			
Level	1,000	1,064	2,226
Grade 20 ft. per mile	547	549	1,128
" 40 "	330	345	734
" 60 "	240	260	522
" 80 "	188	202	410
" 100 "	148	162	330
<i>On 3-degree curves:</i>			
Level	921	1,401½	1,876
Grade 20 ft. per mile	464	716	962
" 40 "	310	485	654
" 60 "	227	360½	488
" 80 "	173	270½	380
" 100 "	137	205½	308
<i>On 10-degree curves:</i>			
Level	692	1,013	1,358
Grade 20 ft. per mile	401	621½	836
" 40 "	270	417	560
" 60 "	197	300½	448
" 80 "	150	230	360
" 100 "	118	212	290

Under the most favorable conditions, loads about 50 per cent. greater than these can be hauled.

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PUBLISHED MONTHLY

BY R. M. VAN ARSDALE.

5 DEY STREET, NEW YORK.

JAMES GILLET, Editor.

L. E. WATERMAN, Corresponding Editor.

APRIL, 1882.

EDITORIAL ANNOUNCEMENTS.

Addresses.—Business letters should be addressed, and drafts and money orders made payable, to THE NATIONAL CAR-BUILDER. Communications for the attention of the Editor should be addressed EDITOR NATIONAL CAR-BUILDER.

Advertisements.—Nothing will be inserted in this journal for pay, except in the ADVERTISING COLUMNS. The editorial department will contain our own views and opinions; and the rest of the reading matter, aside from advertisements, will be such as we consider of interest to our readers.

Contributions.—Articles relating to railway rolling stock construction and management, and kindred topics, by those who are practically acquainted with these subjects, are especially desired. Also early notice of changes in railroad officers, organizations and names of companies.

Special Notice.—As the CAR-BUILDER is printed and ready for mailing on the last day of the month, advertisements, correspondence, etc., intended for insertion, must be received not later than the 25th day of the month.

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SUBSCRIPTIONS TO THE CAR-BUILDER will be received, and copies kept for sale, at the following places:
A. WILLIAMS & Co., 285 Washington St., Boston, Mass.
L. SCHAFFNER, Cigar and News Dealer, Grand Pacific Hotel, Chicago, Ill.
WILLIE H. GRAY, 306 Olive Street, St. Louis, Mo.
ROBERT CLARKE & Co., 65 West Fourth Street, Cincinnati, Ohio.

THE COMMITTEES OF THE CAR-BUILDERS' ASSOCIATION.

A glance at the subjects upon which committees were appointed at the last year's meeting of the Car-Builders' Association, and upon which reports are expected to be made at the approaching June meeting, justifies the hope that the members of these committees are one and all fully alive to the importance of the duties imposed upon them. We have ourselves no doubts about the matter. Yet, from the tenor of sundry inquiries and suggestions that we receive, there seems to be some solicitude on the subject. These inquiries and suggestions come mainly from parties who are interested in one way or another in patented appliances and supply materials, and who are, no doubt, aside from the promptings of self-interest, fully impressed with the need of better, more effective, and more uniform devices for securing a greater degree of safety and economy in the use of rolling stock, and particularly the various classes of freight cars. They want some positive action on the part of the committees in selecting or designating some one or more of the different classes of car attachments as being the best of their kind, or among the best; and then, with an equally positive endorsement of such selection by the association itself, the field of rivalry would be restricted to narrower and less discouraging dimensions. This desire is very natural; but under all the circumstances its immediate gratification can not reasonably be expected.

We have for several years been familiar with the way in which the committees have been accustomed to deal with inventions and devices of this description, and we venture the assertion that it is much easier for outsiders to tell the committees and the association what to do, how to do it, and what not to do, than it is for the committees and the association to carry out the programme. If inventors and patentees can not understand how this is, let them assemble in mass meeting themselves, and decide upon the best cattle car, the best freight brake, draw-bar, brake-shoe, coupler, or other attachment; or select from the general assortment a given number of such superior merit as to be clearly entitled to take precedence of all the rest. We

should really like to be a looker-on in the lobby when the decisive votes are taken, just to witness the unanimity! Such a proceeding might not be precisely analogous in character, but it would be sufficiently so for the purpose of illustration. In the one case an effort is made to harmonize the practice of a multitude of individual roads, and the views of a host of managers and other officials, in respect to matters involving vast trouble and expenditure; and in the other, the adverse interests and fierce rivalries of competing inventors and patentees, and this in the absence of any legal penalties or forfeitures to compel acquiescence in the use of any adopted standards, even if such adoption were possible.

The recent action of the Connecticut Railroad Commissioners, recommending the passage of a law compelling the use of automatic couplers in that State, is a movement that will be watched with a good deal of interest. After taking the initiatory steps, the matter will hardly be permitted to drop without reaching some definite results. Sooner or later, in order to carry the scheme to its consummation, the Commissioners and Legislature will have to descend to particulars, and designate the devices that are to be used in compliance with the proposed law. They will have to select and discriminate, and this will bring them into contact with patents and compel them virtually to advertise somebody's wares. They will, in short, find themselves beset with the same difficulties that have so long perplexed the members of the Car Builders' Association, and it remains to be seen whether they will be any more successful in dealing with them. We have no desire to belittle the importance of the movement or anticipate unfavorable results. On the contrary, we hope that its wisdom will at no distant day be so manifest in increased protection to train men, and in diminished casualties in freight service, that other States will hasten to pass similar enactments.

In saying this much in behalf of the committees, in order that the difficulties with which they have to contend may not be lost sight of, we must at the same time indulge the hope that definite conclusions may, as far as possible, be arrived at with respect to the subjects assigned to them. These conclusions should be stated clearly, without reserve or evasion. The responsibility assumed is not so great as to cause hesitation or halting timidity. When a report is made by a committee, however decided or startling may be its tenor, the association may indorse it or do nothing but talk about it in a rambling sort of way. In the former case it remains for the road managers to consider it, and upon them rests the responsibility of doing or not doing the particular thing recommended. The impression that has long prevailed among the members of the association that it is inexpedient to discuss the merits of patented inventions, and still more inexpedient to indorse or recommend them, is becoming weaker every year, and we are glad of it. It has had no other effect in the past than to hamper investigation, retard progress, and in many cases restrict the committees, which are the working power of the organization, to the making of meager and unsatisfactory reports. An invention of the classes named is intrinsically neither better nor worse for being patented. In dealing with it the only question is whether it is of any use to railroads on the score of convenience, economy and safety in the equipment and running of cars. We sincerely hope that in future there will be no occasion for such an admission as was made by the chairman of a prominent committee at the last annual meeting, and which was to the effect that if the committee, before making its report, had not labored under the impression that it could only investigate and report upon such brake-shoes as were not patented, a very different report would have been made than was made, and that it would have been accompanied with specific data and tests—the very things which were wanted to make the report of any value.

MINERAL WOOL.

The usefulness of this substance is becoming more widely appreciated every day. Not many years ago it was regarded as a curiosity merely, because of its incombustibility, while in its color, fiber and general appearance it bore a strong resemblance to cotton, which is extremely inflammable. From present indications it seems likely to become a much more indispensable article in the economy of life than India rubber, which, as many people will remember, was at first valued only for its convenience in erasing pencil marks.

Mineral wool is a product of the blast furnace, and is produced from molten slag, by allowing it to fall while in a fluid state upon a jet of steam or compressed air, the effect of which is to transform it into a fleecy mass resembling sheep's wool and cotton, but with no common or parallel direction of the fibrous threads. About 80 per cent. of it has to be riddled, which forms the ordinary grade, while the residue is separated by currents of air, and forms the extra grade. The process of manufacture is simple and the product is ready for immediate use. Being absolutely fire-proof, and an unequalled non-conductor of heat, there is hardly any limit to the extent to which it may be usefully applied. No other material is so well adapted to protect water mains and feed pipes from freezing; ice in refrigerators and ice-houses from melting; to insulate cold storage houses and breweries; prevent condensation of

steam in boilers, cylinders and pipes; and the passage of heat through roofs, partitions and side walls; to deaden sound, and check the inroads of vermin and the spread of fire.

It is also a most serviceable article for lining the floors of passenger cars, as a non-conductor of heat and sound, and as a check to the progress of fire. It is already used to a considerable extent for this purpose, but not universally. The practice of stuffing the spaces between the false floor and the floor proper with shavings is quite common, but the lesson of the Spuyten Duyvil calamity ought to put an end to it. There is no better or more durable substitute than mineral wool; and in respect to cheapness, the difference is as nothing when weighed against the benefits to be derived from it. A space of three or four inches in thickness packed with the ordinary grade, would render this much of the car flooring incombustible, besides deadening noise, and increasing the warmth in cold weather; and if a lining of extra or even inferior grade were introduced in the sides, ends and roofs of cars, it would prevent the escape of heat from the inside in winter, and also prevent it from penetrating from the outside in summer. The whole expense of lining a car in this way is estimated at about \$30; and so far as we are informed, the lining will not deteriorate during the life of the car, but can even be used again after the car is worn out.

The article is manufactured and supplied by the United States Mineral Wool Company, 16 Cortlandt street, New York.

THE GRAYDON SAFETY CAR HEATING APPARATUS.

The warming of railway cars with steam from the locomotive is generally regarded as impracticable, for the reason that sufficient steam for such purpose can not be spared from the engine without diminishing its capacity for moving trains of ordinary weight and at the usual speed. The necessity, however, of warming cars in some way that will render them less liable to take fire in train collisions has of late attracted much attention; and having noticed within the last few weeks several brief allusions in railway and other papers to a new method of warming cars with steam from the engine, for which it is claimed that the difficulty referred to is overcome, we have applied to the inventor for more particular information in regard to it, which we now lay before our readers.

It is called the Graydon Safety Car Heating Apparatus. The heat used is derived entirely from steam generated in the boiler of the locomotive, but under such conditions that the cars of a train can be warmed, not only without having any fire in them, but without any special consumption of fuel for that purpose, nor any perceptible tax on the hauling power. The method of the inventor is based on the fact that a large quantity of live steam is wasted from locomotives by intermittent blowing-off, and that the heat thus dissipated and lost is more than enough, if properly utilized, to keep a train of passenger cars well warmed. This waste steam, which is entirely independent of the cylinder exhaust, is turned to account by being conveyed to a reservoir or upright boiler in the baggage car, into the lower part or water space of which it is admitted at boiler pressure through a check-valve, heating the water in the reservoir to nearly steam temperature, and forming steam above the water line, from which it is fed continuously to the cars, the pressure in the pipes running through the cars being adjusted by an automatic regulator, which is constant for a single adjustment, and can be set according to the degree of heat required. In this way the blow-off steam, which would otherwise be lost, is husbanded or stored up in the reservoir, from which it makes the circuit of the cars in pipes, going down on one side and returning on the other to the tender, where it is discharged into the feed water, thus returning to the engine boiler a large portion of the heat originally taken from it. There is also an arrangement for using a portion of the exhaust without interfering with the draft. This is done by tapping the exhaust near the cylinder, and on one side only, with a one-inch pipe, and contracting the nozzle of the exhaust to the same area as that of the tapping pipe, thus keeping the force of the blast uniform, and using for the cars only the excess or overplus. In ordinary running, however, it has thus far been found to be unnecessary to use exhaust steam at all.

The reservoir or special boiler in the baggage car is not intended to be used for generating steam unless the locomotive from any cause becomes disabled. It is provided with a safety valve to relieve it, when necessary, of undue pressure, and is also thoroughly enveloped in non-conducting material to prevent loss of heat; so there will always be a sufficient quantity available to warm a train preparatory to starting. There are flexible metallic connections, with four ball-and-socket joints, between the cars, and with automatic valves to prevent the escape of steam from the pipes in case of the parting of a train. It is claimed also that the constant movement of the steam in the pipes carries the condensation along with it, and that consequently there is no danger from freezing. To provide for warming a car singly, which may sometimes be necessary when detached on sidings, it is contemplated to place in each car a small generator, occupying a small space, and to be used only in special emergencies. This,

however, is a feature of the plan to be matured hereafter if it shall be deemed essential.

It will be seen that this arrangement differs from other attempts that have been made to use steam from the locomotive for the warming of cars, in the important point only of utilizing the blow-off or waste steam, by storing it up, and then feeding it out as circumstances may require. It remains to be determined, however, whether the plan in its practical working is free from such unforeseen and compensating drawbacks as might render the ordinary methods of heating preferable, even with the hazards with which they are necessarily attended. The saving of the fuel that is now used for heating each car independently, as well as the time and labor in attending to stoves, would offset to a very considerable extent the trouble of maintaining double connections between the cars, or other incidental disadvantages.

The apparatus, we are informed, has been in operation for several months on an accommodation train of the Troy & Boston Railroad for the purpose of testing its efficiency, and the engineer of the train, Mr. Fred. Vandervoort, certifies that it is an excellent device for warming cars, that it gives no trouble, and does not interfere with the steaming of the engine. The fireman, conductor, baggage master and brakeman of the train also concur in representing it as altogether satisfactory in its working, consuming no fuel, giving an even, steady heat, requiring little attention and being perfectly safe. It is also stated that in cases where any steam has been taken from the boiler, in addition to the blow-off, the gauge has never indicated loss of more than one pound.

Since the above was written, we have received a copy of the report of the above named road, signed by the President and Superintendent, stating that the apparatus has been in operation since last October on a train running between Troy and North Adams, and that the merits of the principle upon which it is constructed and applied have been satisfactorily demonstrated.

MR. VANDERBILT, in speaking of the recent disastrous war of rates, is reported as saying: "I have learned lessons from it I shall never forget. I have no doubt that the officers of all the roads are wiser than they were a year ago. The war has cost a great deal of money, and the only practical advantage that has been gained is the knowledge how cheaply the work of transportation can be done." This is a frank admission, and should be carved on an imperishable tablet and placed in the sanctum of every railway manager in the country, and particularly in the throne-rooms of the "Kings." To be sure, we are to have a five years' truce, a millennium so to speak; but a truce is not friendship, and it is well that the belligerents should have constantly before their eyes a tangible reminder of "how cheaply the work, etc."

A CORRESPONDENT wants to know whether the power of elliptic bolster-springs for passenger-car trucks should be sufficient to sustain the whole weight of the car body, or whether such weight is carried by the equalizing-bar springs. We reply that the springs on the equalizing bars carry the entire weight of car body and truck, except wheels, axles and equalizers; and that the elliptics carry only the weight of the car body and truck bolsters. This must be obvious to any one who gives the least attention to the construction and arrangement of the parts.

THE correctness of the statement made by Mr. Albert F. Hill, C. E., at the December meeting of the car-builders, that brass measuring tapes for sizing wheels expanded by cold and contracted by heat, was squarely denied by Mr. John Orton, of the Canada Southern Railway, in our February issue, who asked for facts and demonstration. As Mr. Hill had not responded to the request, the conclusion is that he was mistaken.

WE are requested to say that the Graydon Safety Car Heating Co., a description of whose apparatus we print elsewhere, offers to equip with it, at its own expense, the longest passenger train of any railway company that may accept the offer, and will demonstrate: 1. How such train can be heated under all conditions of weather with steam from the locomotive without taxing its capacity. 2. When the train is snowed up and the fire in the locomotive is out. 3. When one or more cars are detached and laid up on a siding waiting for another train; or when a baggage or other car is taken out on account of a broken wheel or other accident. The company may be addressed at Newport, R. I.

THE North Carolina Car Co., Raleigh, N. C., commenced business March 1, having increased its capital to \$50,000. The officers are Maj. John C. Winder, President; T. A. Kingsley, Superintendent; and D. A. Hearsh, Secretary and Treasurer. Maj. Winder is General Superintendent of the Raleigh & Gaston road. Mr. Kingsley has already built 200 freight cars for the road as a private enterprise, and with such success as to warrant the formation of this company to work under his supervision. The location has a peculiar advantage in being accessible to the best long leaf pine timber. Besides building freight cars complete, the company propose to furnish car bodies "knocked down," so as to deliver a larger number in a given time.

Details of Cost of One Standard Passenger Locomotive Truck—Chicago & Alton Railroad.

1 Truck Saddle.....	1,175 lbs.	\$23.50
8 Pedestals.....	328 "	6.50
4 Truck Boxes.....	512 "	10.24
4 Truck Box Cellars.....	72 "	1.44
4 Bottom Spring Pockets.....	100 "	2.00
2 Top Spring Pockets.....	70 "	1.40
4 Oil Caps.....	7 "	.14
2 Side Bearings.....	50 "	1.00
4 Axle Collars.....	80 "	1.60
4 30-in. Wheels.....	1,926 "	38.52
2 Steel Axles.....		48.70
1 Swing-Beam.....		8.10
2 Swing-Beam Hangers.....	48 "	2.16
2 Swing-Beam Hanger Pins.....	6 "	.37
1 Center Pin.....	298 "	4.56
4 Braces.....	110 "	42.00
2 Frames.....	380 "	17.10
2 Bottom Braces.....	154 "	6.82
4 Equalizers.....	400 "	18.00
2 Check Chains.....	16 "	.72
1 Center Pin Bolt and Key.....	13 "	.58
8 Wheel Cover Braces.....	48 "	1.60
4 Springs.....		32.68
34 Bolts.....	34 "	1.58
4 1-in. Bolts.....	6 "	.37
4 1/2-in. Bolts 12 1/2-in. long.....	6 "	.37
4 1/2 Axle Collar Bolts.....	3 "	.13
2 Eye Bolts.....	4 "	.18
4 Collar Pins and Keys.....	6 "	.37
4 Wheel Covers.....	52 "	1.82
4 Pieces Gas Pipe.....		.11
44 1/2-in. Nuts.....	65 "	.65
12 1/2-in. Nuts.....	13 "	.13
4 1-in. Nuts.....	11 "	.11
2 lbs. Woolen Waste.....		.24
1 1/2 Gallon Tallow.....		.60
Total Cost of Material.....		\$256.17
Blacksmith and Machinists' Labor.....		75.00
Total Cost of Truck.....		\$331.17

THE Virginia Iron Works, of Norfolk, Va., T. W. Godwin & Co., proprietors, have been building locomotives for wooden tramways for many years. In 1879 they commenced building locomotives for narrow-gauge roads, and have just shipped to the Des Moines branch of the Wabash St. Louis & Pacific the first one of a lot of seven for the narrow-gauge branches of that road. It is of the ordinary 8-wheel pattern, and weighs 40,000 pounds, has 49-in. drivers and 14 x 18 cylinders. The smallest inside diameter of boiler is 40 in., the wagon-top is raised 54 in., there are 102 2-in. tubes 9 ft. 64 in. long; and the fire-box is 60 in. long, 194 in. wide at the bottom, and flares out above the frame to a width of 37 in. at the top. The fire-box sheets are 1/2 steel, the flue sheets 1/4-in. steel, and the rest of the boiler 1/4-in. iron. It is very substantially braced. The angle-iron across the head has four braces bolted through the first crown-bar, and the first three crown-bars are tied together over the top by clamps, which are held by the crown-bar bolts. The longitudinal braces from the head of the boiler and the front flue-sheet cross each other; the back braces being fastened to the front edge of the middle boiler course, and the front braces to the back edge of the same sheet. This method takes the strain of these braces from the circumferential seams of the boiler. There are cross-braces in every other space between crown-bars. All braces throughout the boiler have forked ends, and are attached to the lugs with pins. The travel of the eccentrics is 44 in., of the valve 3 1/2 in., the offset of the saddle-pin 1/4 in. of an inch. The valve has 1/2-in. lead, 1/4-in. outside and 1/4-in. inside lap. The other six locomotives will be built after the same pattern, except that two of them, for passenger service, will have 49-in. driving wheels.

THE Niagara Refining Company, of Buffalo, N. Y., has one of the most complete establishments in the country for refining petroleum, and for the manufacture of all its products, including all kinds of kerosene and lubricating oils. Mr. H. M. Backus is general manager, and has had large experience in the business. The Niagara is independent of the Standard Oil Co., and all other combinations.

MANNING, MAXWELL & MOORE, manufacturers of and dealers in railway supplies and machinists' tools, 111 Liberty street, New York, are preparing to issue a most complete and comprehensive hand-book for the use of dealers and consumers in their line, and would be glad to receive duplicate lists of desirable specialties from parties who may wish to have them form a part of the catalogue. It is estimated that the book will contain about 400 pages.

Our Directory.

We note the following changes since our last issue. Readers are requested to give us prompt notice of changes when they occur:

Buffalo, New York & Philadelphia.—Henry Wagner has been appointed Master Mechanic in charge of the Buffalo shops in place of Allen Vail, promoted to be Superintendent of Motive Power and Machinery.

Cheapeake, Ohio & Southwestern.—C. A. Simon has been appointed Master Mechanic of the shops at Paducah, Ky.

Cincinnati Northern.—Mr. George L. Barringer has been appointed General Manager. He was at one time Superintendent of the Indianapolis, Cincinnati & LaPorte road.

Cleveland & Marietta.—E. C. Hill has been appointed Master Mechanic in place of Thomas Robinson, resigned.

Connoton Valley.—C. G. Patterson has resigned the position of General Manager.

Denver & Rio Grande.—George W. Cushing has resigned his position as Superintendent.

Eastern Maine.—This company is the successor of the Bucksport & Bangor under the new organization. L. L. Lincoln is Superintendent.

East Tennessee, Virginia & Georgia.—Henry Fink has been appointed General Manager, with office at Lynchburg, Va.

Indianapolis & St. Louis.—T. W. Ransom is Master Mechanic and Car-Builder of the shops at Mattoon, Ill.

Jacksonville, Pensacola & Mobile.—W. M. Davidson has been appointed General Manager in place of C. H. Allen, resigned. Mr. Davidson was formerly connected with the road.

Louisville, New Albany & St. Louis.—The name of this road has been changed to Louisville, Evansville & St. Louis.

Milwaukee, Lake Shore & Western.—John Hickey is now Master Mechanic, succeeding S. Charnley, who has gone to the Chicago, Milwaukee & St. Paul.

New York & New England.—J. C. Rawn has resigned the position of Superintendent of the Western and Springfield Division on account of ill-health, and the office is abolished.

Natchez, Jackson & Columbus.—Col. J. H. Fitzpatrick has resigned as Superintendent, and is succeeded by Belton Mickel.

Norfolk & Western.—W. C. De Armond is Purchasing Agent, with office at Philadelphia; N. M. Osborne, Superintendent Eastern Division, with office at Petersburg, Va.; Frank Huger, Superintendent Western Division, with office at Lynchburg, Va.

Raleigh & Gaston.—Major John C. Winder, for a long time General Superintendent, has been appointed General Manager, with office at Philadelphia; N. M. Osborne, Superintendent Eastern Division, with office at Petersburg, Va.; Frank Huger, Superintendent Western Division, with office at Lynchburg, Va.

Richmond & Petersburg.—Major E. D. T. Myers has been appointed Superintendent in place of T. D. Kline, resigned. Major Myers will still retain his position as General Superintendent of the Richmond, Fredericksburg & Potomac road.

St. Louis, Iron Mountain & Southern.—Robert M. Richardson has been appointed Master Mechanic of the Arkansas Division, in place of L. Finlay, resigned.

Texas & St. Louis.—J. B. Van Dyne has been appointed General Superintendent, vice J. W. Brown. L. B. Fisher is Purchasing Agent at Tyler, Texas, and F. W. Paramore at St. Louis, Mo.

Toledo, Delphos & Burlington.—A. T. Stewart, late of the Cincinnati, New Orleans & Texas Pacific, has been appointed Master Mechanic of the Toledo and Dayton Division in place of E. Clemens, resigned.

Union Pacific.—W. J. Kelley is Superintendent of Kansas Central Division, with office at Leavenworth, Kansas.

Wabash, St. Louis & Pacific.—J. B. Barnes has been appointed Master Mechanic of the Eastern Division, with office at Ft. Wayne, Ind., in place of Chauncey R. Morris, resigned.

Employment.

Advertisements will be inserted under this heading for one dollar for each insertion.

WANTED.—A position as Foreman Painter in a railroad shop. Have had seven years experience, and charge of a shop six years. The best references given. Address NATIONAL CAR-BUILDER, 5 Day street, New York.

WANTED.—A position as Superintendent or Assistant Superintendent of Car Works, Master Car-Builder or General Foreman of a Railroad Car Department, or Inspector of Rolling Stock under construction. The applicant has had large experience in each of these capacities, and can furnish first-class references. Address "D," Office of NATIONAL CAR-BUILDER.

FORGINGS.—A practical man having some capital to invest would like to hear from parties who are desirous of establishing the forging business. Address, stating location, chances for business, and inducements that can be offered, W. H. N. & Co., Office of NATIONAL CAR-BUILDER, 5 Day street, New York.

CAR-BRAKE SHOE INFRINGEMENT.

Extract from specifications of original letters patent No. 217,006, dated July 29, 1879, issued to John F. Curtice, for an improvement in Car Brake Shoes: "My invention is an improvement upon the Car Brake shoe patented March 21, 1876, by J. H. Congdon."

Extract from legal opinion given by West & Bond, of Chicago: "We have examined patent to Congdon, No. 174,808, also reissue 9,329, to John F. Curtice, also his original patent, No. 217,006. Question submitted is, does the device described and claimed by said reissue infringe the patent to Congdon? Congdon, as we understand the law, having pieces of some other metal embedded in its face, and the claim of his patent is for such a shoe. The patent is not limited to any special arrangement of the embedded pieces, and their form and size is not material. The Curtice shoe is composed of a cast-iron body, having wrought iron embedded in its face, and hence it is substantially the same thing as the Congdon shoe. There is only a slight difference in construction between the Congdon and the Curtice shoe, and in this slight difference is found the foundation for the Curtice patent. It is manifest that the Curtice patent, the original of which is dated July 29, 1879, is for an improvement upon the Congdon shoe. This fact is squarely stated by the original patent. The reissue, in fact, admits prior existence of the Congdon. It is proper to refer to an original patent in constructing a reissue, and Curtice, by omitting from the reissue the clause which states that his invention is an improvement on the shoe patented by Congdon, cannot escape the force of the admission. Congdon having a claim which covers the invention is not limited to the exact mode of construction described, and is entitled to hold as an infringement a shoe substantially the same, and varying only in some detail of construction. In our opinion, the car-brake shoe described and claimed in and by the Curtice reissue does infringe the invention claimed by the Congdon patent, and is an infringement thereof."

(Signed) WEST & BOND, CHICAGO, Feb. 17, 1882.

Railroad now using or which may use the Congdon Brake Shoe, under the letters patent, will be protected by

THE CONGDON BRAKE-SHOE CO.,

Chicago, Ill.

CONTINUOUS DRAW-BAR PATENTS.

The following circular has been issued by the Secretary of the Western Railroad Association:

CHICAGO, Sept. 9, 1880.

To the Members of the Association:
GENTLEMEN: Claims have been pending for several years that the Continuous Draw-Bar, sold by the Continuous Draw-Bar Company under the Middleton and Patterson patents, is an infringement of patent No. 17,280, granted 3d December, 1867 (re-issue No. 8,003, granted 10th February, 1879), to Edward L. Clegg.

This Association has continuously advised against entertaining this claim, but to quiet all questions, and at our instigation, the Continuous Draw-Bar Company has recently purchased the Clegg patent, its owner inserting in the assignment a full and absolute release to all the members of the Eastern and Western Railroad Associations from any and all liability for, or on account of, any infringement heretofore of said patent.

Yours truly,

J. H. RAYMOND, Secretary, etc.

CLARENCE BROOKS & CO.

MANUFACTURERS OF

RAILWAY CAR & FINE COACH VARNISHES.

Cor. West and West 12th sts., New York.

JOHN W. MASURY & SON,
MAKERS OF STRICTLY FIRST-CLASS

Railway Varnishes,

AND MANUFACTURERS OF

CAR BODY COLORS.

By permission, we refer to the following Companies, for whom we have made Special Colors:

PENNSYLVANIA RAILROAD CO., Enoch Lewis, Purchasing Agent, Philadelphia, Pa.
PENNSYLVANIA CO., Wm. Mullins, General Purchasing Agent, Pittsburgh, Pa.
BALTIMORE & OHIO RAILROAD CO., S. S. Hill, Purchasing Agent, Baltimore Md.
CHICAGO & ALTON RAILROAD CO., A. V. Hartwell, Purchasing Agent, Chicago, Ill.
CHICAGO & NORTHWESTERN RAILROAD CO., R. W. Haner, Purchasing Agent, Chicago, Ill.
LEHIGH VALLEY RAILROAD CO., L. Chamberlin, Purchasing Agent, Philadelphia, Pa.
NORTHERN RAILROAD OF CANADA, F. W. Cumberland, Superintendent, Toronto, Ont.
NACUATUCK RAILROAD CO., G. W. Beach, Superintendent, Waterbury, Conn.
PHILADELPHIA, WILMINGTON & BALTIMORE RAILROAD CO., S. A. Hodgman, Superintendent of Motive Power, Wilmington, Del.
NEW YORK, NEW HAVEN & HARTFORD RAILROAD CO., E. N. Dowd, Commissary, New Haven, Conn.

UNION PACIFIC RAILROAD CO., A. D. Clark, Purchasing Agent, Omaha, Neb.
KANSAS
CHICAGO, BURLINGTON & QUINCY RAILROAD CO., Wm. Irving, Purchasing Agent, Chicago, Ill.
LOUISVILLE, CINCINNATI & LEXINGTON RAILROAD CO., Wm. Mahl, Purchasing Agent, Louisville, Ky.
GRAND TRUNK RAILWAY S. W. Wall, Fort Huron, Mich.
LITTLE ROCK & FORT SMITH RAILROAD CO., T. Hartman, Purchasing Agent, Little Rock, Ark.
GILBERT & HUGH CO., Troy, N. Y.
WASON MANUFACTURING CO., Brightwood, Mass.
BILMEYER & SMALL MANUFACTURING CO., York, Pa. Railroad Car Builders.
JACKSON & SHARP CO., Wilmington, Del.
BARNEY & SMITH MANUFACTURING CO., Dayton, O.

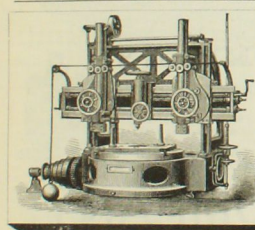
The advantages derived from the use of such Special Colors are many, a few of which are found below:
ABSOLUTE UNIFORMITY OF SHADE. DURABILITY, as we use perfectly pure materials. **SAVING OF MONEY,** because of small quantity required. **SAVING OF TIME,** in the putting on of the same. **SAVING OF LABOR AND MATERIAL,** as no extra amount of Varnish will be required to hide a sanded surface. **LARGER DEGREE OF CERTAINTY** that there will be an absence of cracked work, as our mixtures are all uniform, being done by weight only.
We make any desired shade, it only being necessary that purchasers furnish us with sample of color desired, stating the time they would like to have the paint dry in.
We shall be glad to furnish samples and give prices to who may wish to avail themselves of the above advantages.
Very respectfully,

JOHN W. MASURY & SON, New York and Chicago.

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BILLINGS, TAYLOR & CO.,

COLOR MAKERS AND MANUFACTURERS OF
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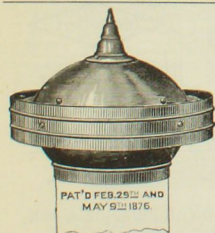
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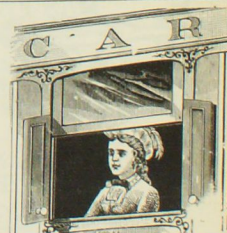


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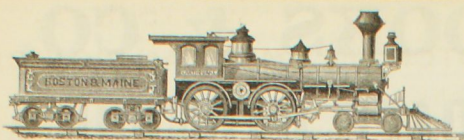
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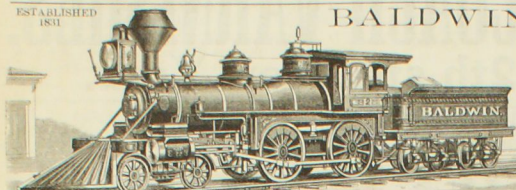
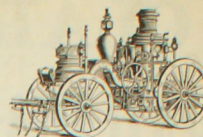
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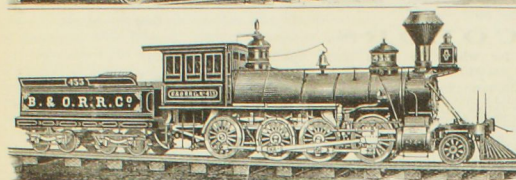
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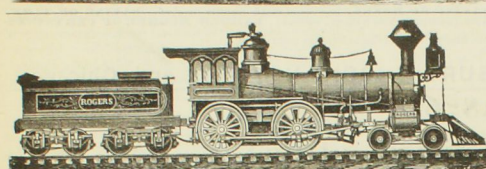
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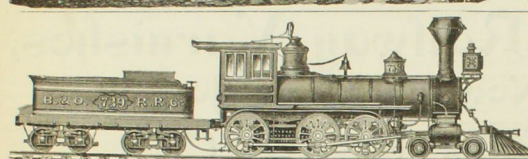
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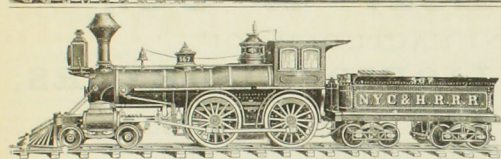
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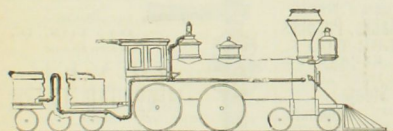
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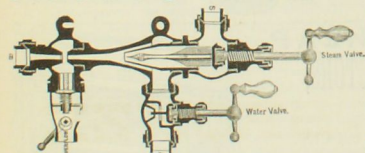
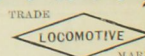


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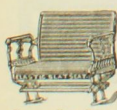
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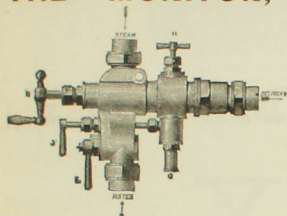
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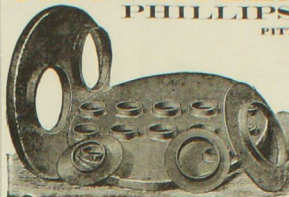
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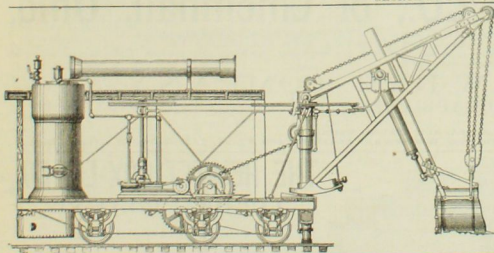
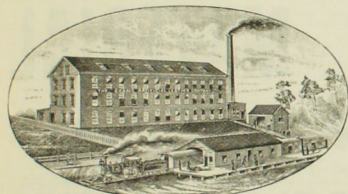
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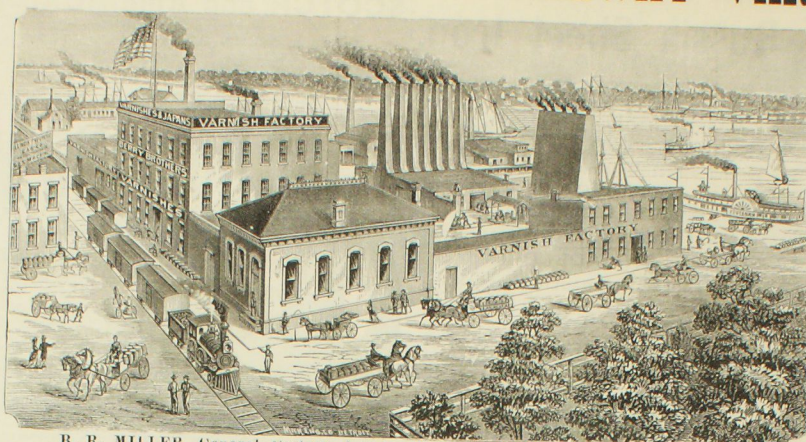
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B. R. MILLER, General Eastern Agent. W. L. EN EARL, General Western Agent.

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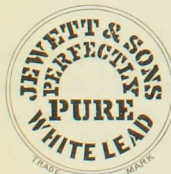
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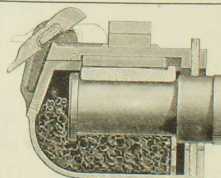


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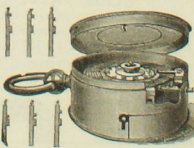
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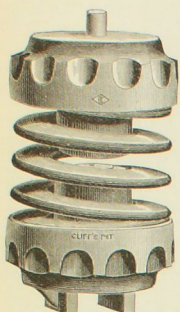
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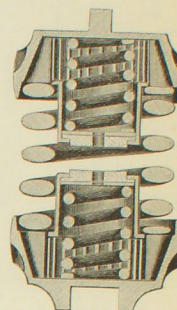
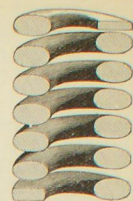
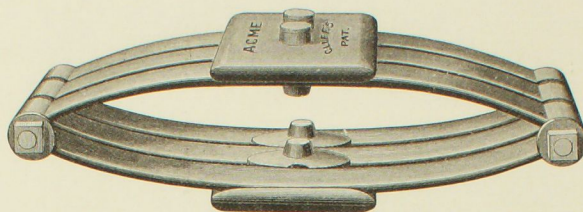


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BETWEEN

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PATENTEE AND MANUFACTURER OF

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AND

T. V. LE ROY

A SECOND DECISION WAS RENDERED JUNE 7, 1881.

IN FAVOR OF HOPKINS.

The closing paragraphs of said decision read as follows:

"As the proofs stand, therefore, Hopkins was the first to conceive, the first to disclose to others, the first to embody in models, the first to reduce to practice, and the first to apply for a patent. Le Roy was first to obtain a patent, but under circumstances which do not give him the *prima facie* case which a patent usually implies."


"We must find priority of invention to be with D. A. Hopkins, and affirm the examiner's decision."

H. H. BATES,
R. L. B. CLARKE,
R. G. DYRENFORTH,
Examiners-in-Chief

WILSON, WALKER & CO.

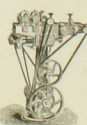
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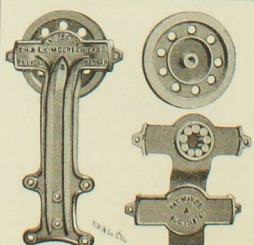
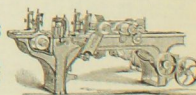
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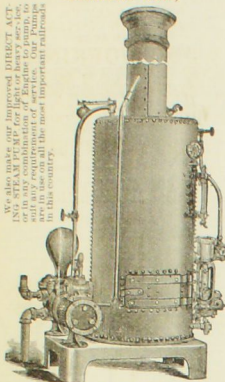
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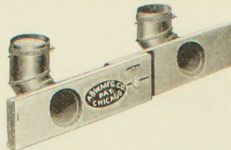
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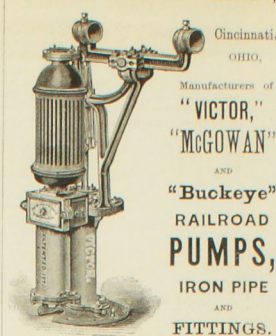
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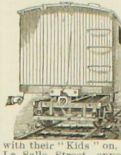
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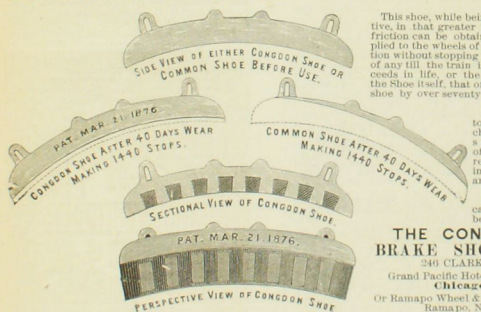
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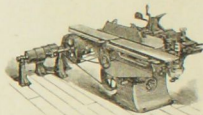
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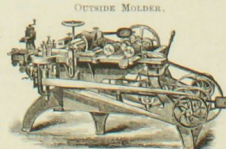
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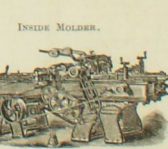
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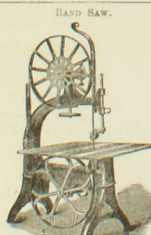
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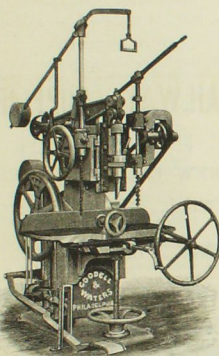
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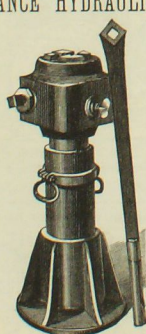
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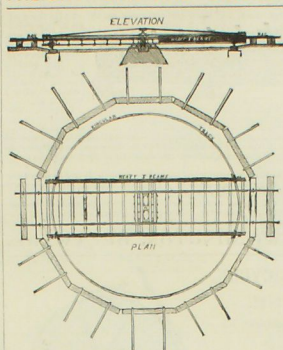
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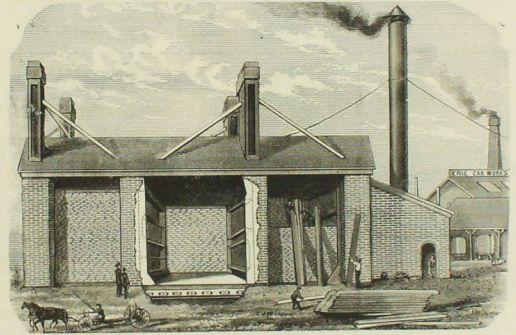
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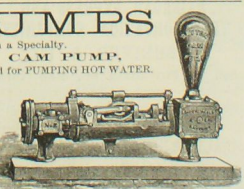
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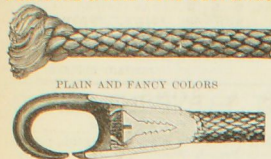
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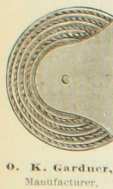
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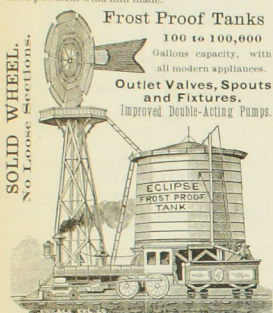
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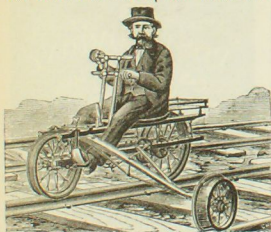
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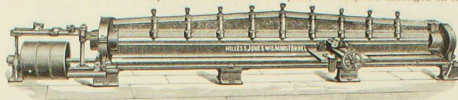
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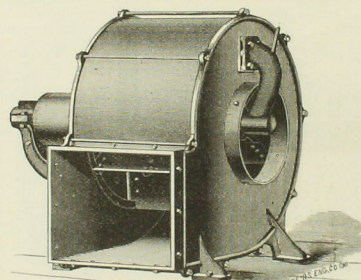
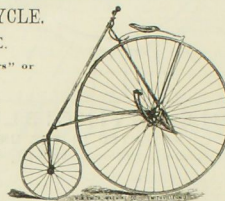
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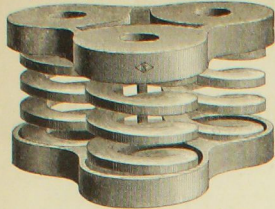
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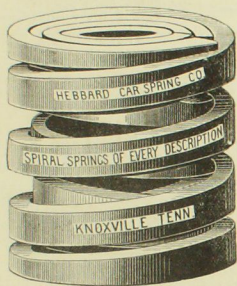
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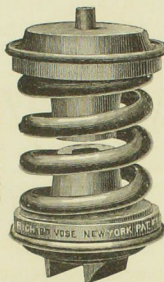
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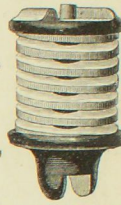
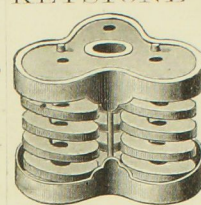
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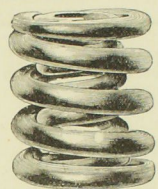
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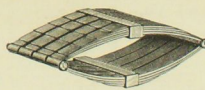
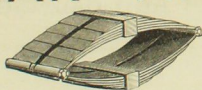
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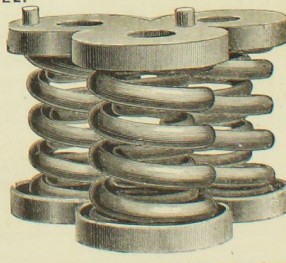
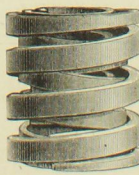
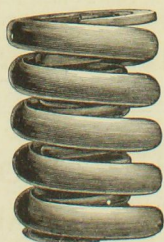
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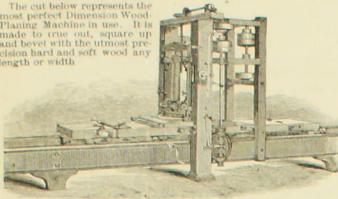
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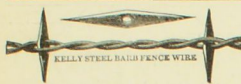
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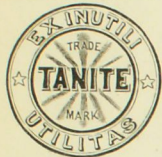
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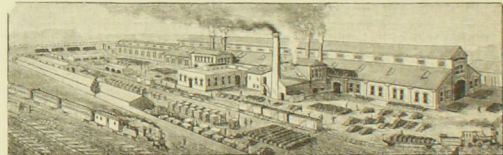
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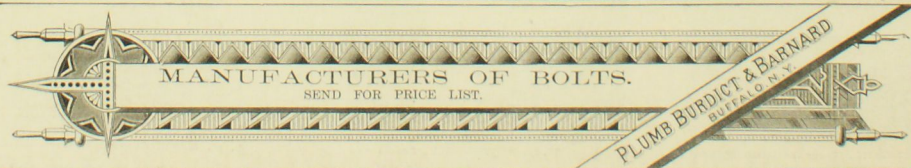
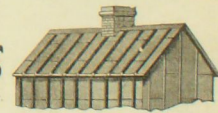
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